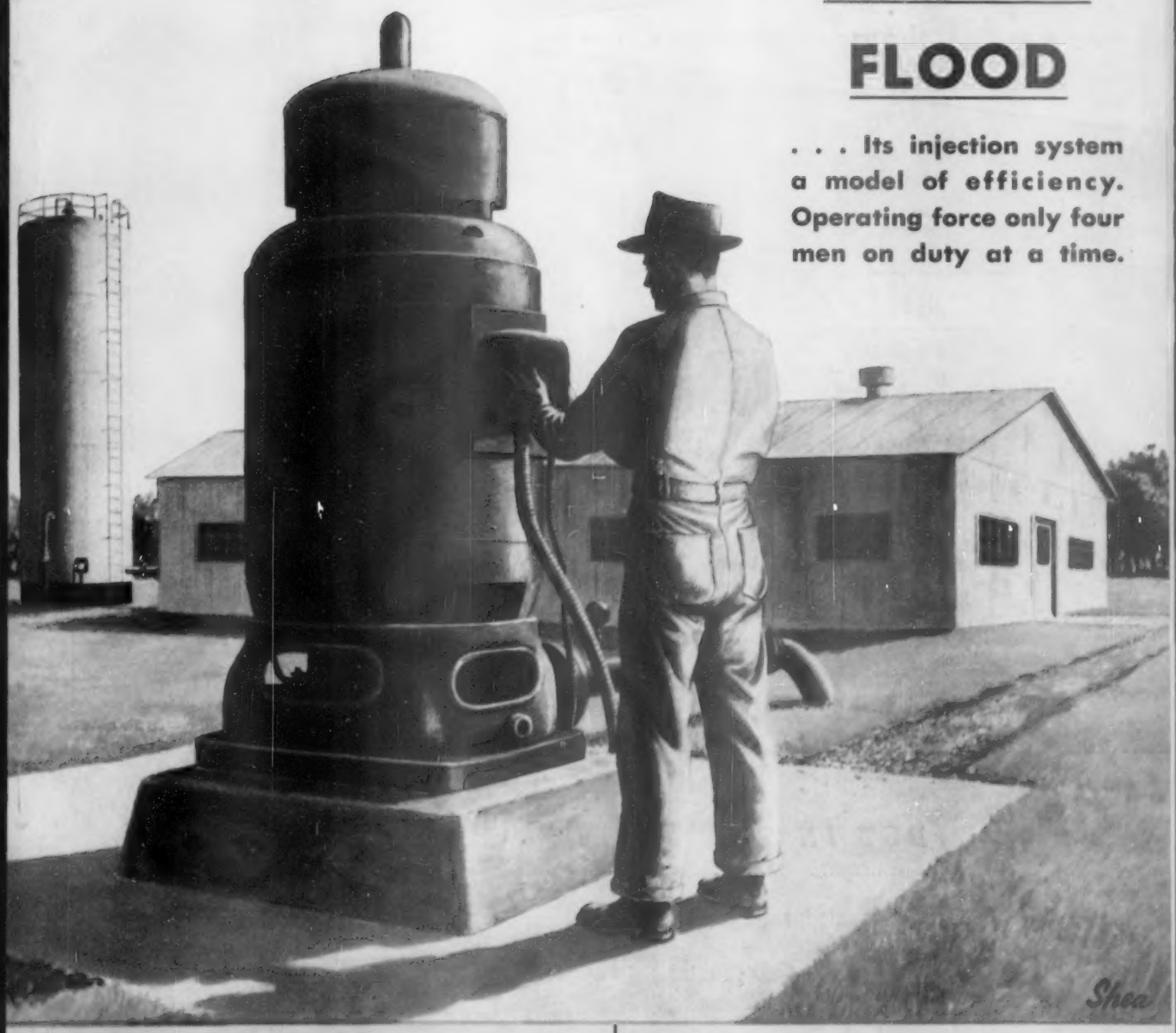
APRIL 25, 1955

the OIL AND GAS JOURNAL

SACROC FLOOD

. . . Its injection system a model of efficiency. Operating force only four men on duty at a time.



IMPORTS ON THE EAST COAST . . .
Who's refining them and where • 78

Beginning **THE FOREMAN'S PAGE**
Job tips for process men • 130

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PROGRESS IN SERVICE THROUGH RESEARCH

DUNCAN, OKLAHOMA

PAGE 1 ONE . . . *a glance ahead*

Threat to railroad use of diesel fuel in future locomotives lies in power turbine burning powdered coal, now apparently nearing perfection under $3,000,000 research program financed by coal industry. If successful, new turbine might undercut natural gas and residual oil for stationary power plants.

Gasoline competition makes refiners look at possibilities of more severe catalytic reforming. Goal of 100-octane reformate without great sacrifice in yield may be achieved by new catalysts, greater over-all efficiency, and close attention to utility and auxiliary costs.

Current cutbacks in refinery runs are no greater than normal for this season of the year. Unless there are substantially larger reductions soon, products stocks will rise to unwieldy size.

More refining capacity is still needed for defense, in view of military planners. Forthcoming report may also suggest stand-by crude producing and pipeline capacity. Industry probably will be expected to finance and carry this unaided by government subsidy.

There's a strong chance the FPC will rule that standard casing-head contracts do not bring producers under federal control. This would reverse the position of the FPC staff. The staff follows the concept of "uninterrupted flow" of gas from well to interstate commerce, would exempt only production and gathering facilities. Commissioners may hold that federal control of processed gas starts at plant tail gate, taking cue from recent Supreme Court case on Oklahoma minimum price.

California's major dry-gas producing area, Sacramento Valley, will see a record amount of drilling activity this year. There is a good backlog of proved locations to be drilled, and several major operators are making extensive wildcatting plans.

Mexico will make serious attempt to export natural gas to United States as soon as Congress clarifies extent of federal control over production. FPC's authority over imports of gas may be restated by the legislation.

the OIL AND GAS JOURNAL

APRIL 25, 1955 • VOLUME 53 • NUMBER 51

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TECHNOLOGY—OPERATION

Sacroc—Biggest Water-Flood Acreage 102
By Ed McGhee

Careful planning for the construction and initial operation of Sacroc Unit's water-injection system paid off when all 53 injection wells were put in operation within 12 hours. Now the operating force is only four men on duty at a time, one at the water-treating plant, and one at each of the three high-pressure injection stations.

Centrifugal Compressors at Gulf's Ethylene Plant 107

Here is one of the country's largest single installations of steam-turbine-driven centrifugal compressors. Five turbines and one gas expander provide a total of 19,850 hp. to drive the five centrifugal compressors.

North Dakota Today—A Status Report 109
By J. D. Lankford

This report places special emphasis on sulfur-recovery facilities in the Williston basin. The sulfur-recovery plant processes gas from 392 of the state's 423 oil wells. Plant is sized for 65 long tons of sulfur per day and is currently producing about 30. Proved sulfur reserves amount to some 723,000 long tons.

A New Emulsion-Oil Drilling Mud 113
By H. M. Barrett

Australian tannin and high-aniline-point oil are used in a new oil-in-water emulsion mud system. The tannin enables better control of viscosities and gel strengths of the mud. The oil disperses well into the emulsion, and does not mask odor or stain of formation oil. It does not cause rubber deterioration.

Have You Tried High-Alumina Catalyst? 115
By H. B. Loper

High-alumina catalyst has greater activity stability in a catalytic cracker. It will permit selectivity improvement for operation at lower temperatures. Lower stack losses will result when you use this material.

How a Young Engineer Gets Ahead 120
By Arthur J. Altz

The young engineer entering industry from college should pay attention to (1) attitude, (2) ideas, (3) reputation, and (4) cooperation. He should be humble and admit his inexperience. He should approach each problem with a questioning attitude. He should always look to his reputation. He should cooperate as fully as possible with his coworkers.

Centrifugal Compressors for Gas Pipelines 123
By T. C. Heard

Selecting the right centrifugal compressor to do the job on a gas pipeline is not a thing of chance. It should be done accurately. This article develops the steps which should be taken in selecting a centrifugal compressor to be driven by a combustion gas turbine for gas-pipeline pumping.

Pipeline Patrol: In Louisiana's Marshes 148
By Wayne T. Corley

Interstate Oil Pipeline Co. has added 25 miles of 8 and 12-in. line to extend its South Louisiana system to the edge of the Gulf of Mexico. This article outlines the problems encountered and the solutions which Interstate developed to meet them.

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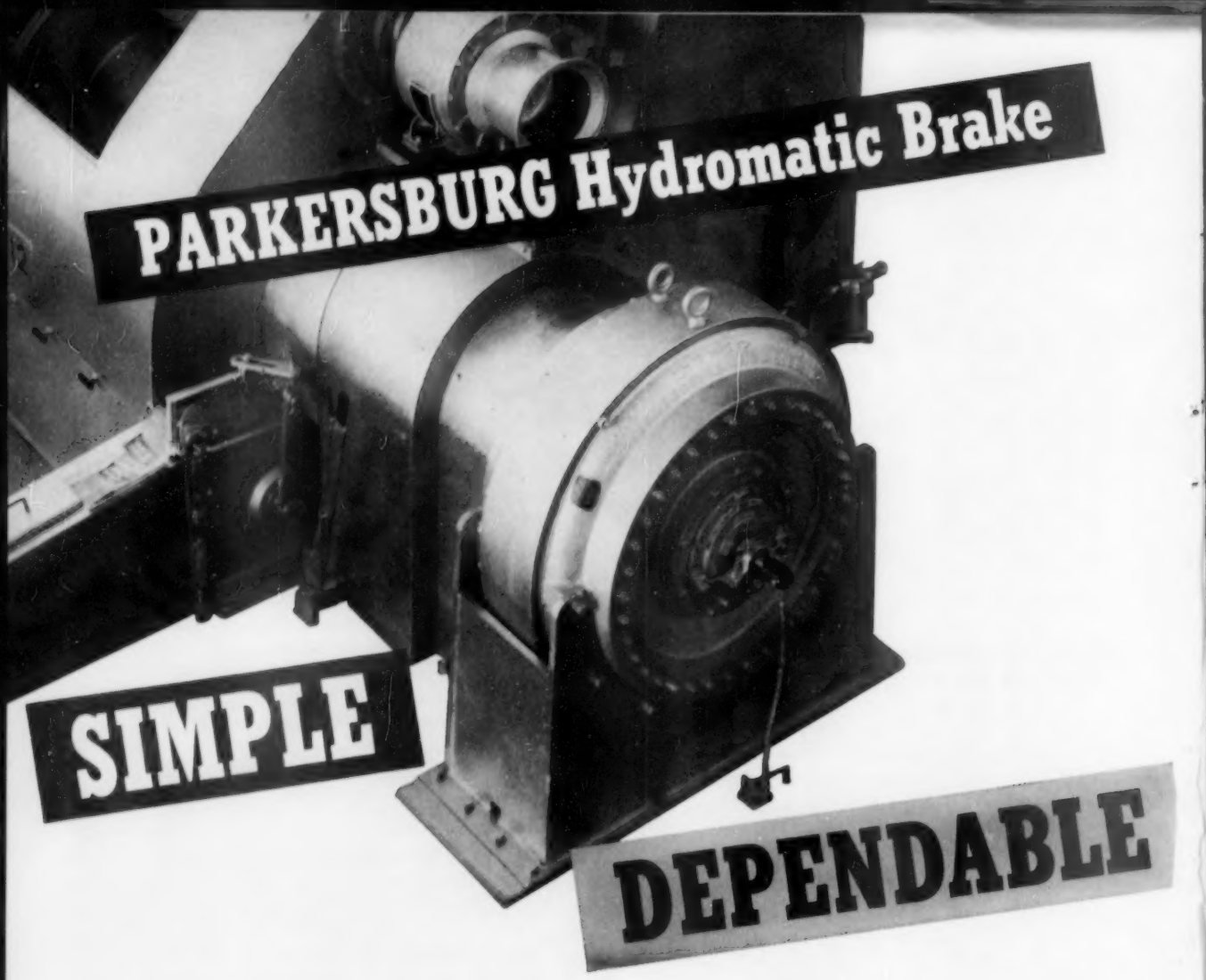

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This liner (unretouched photo) was taken from a pump operating in a Mid-Continent oil field. Note how the effect of impact and corrosion has caused splitting and channeling. Cause of this breakdown might well be the operator's choice of a pump liner not designed to meet the conditions existing in the well.

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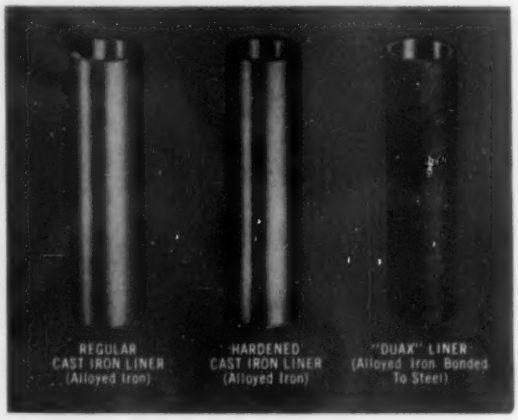

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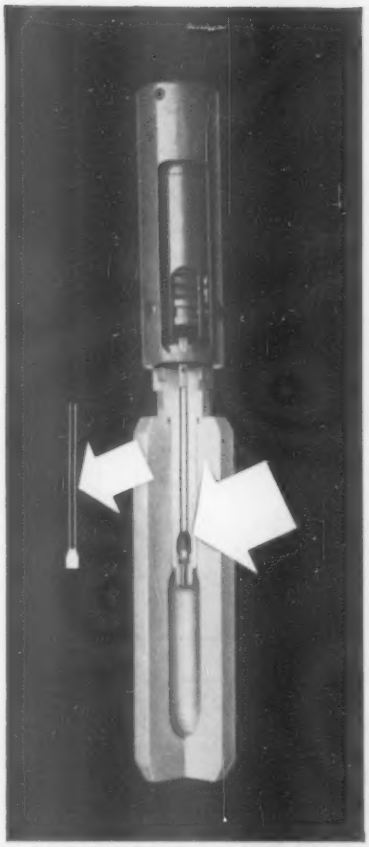

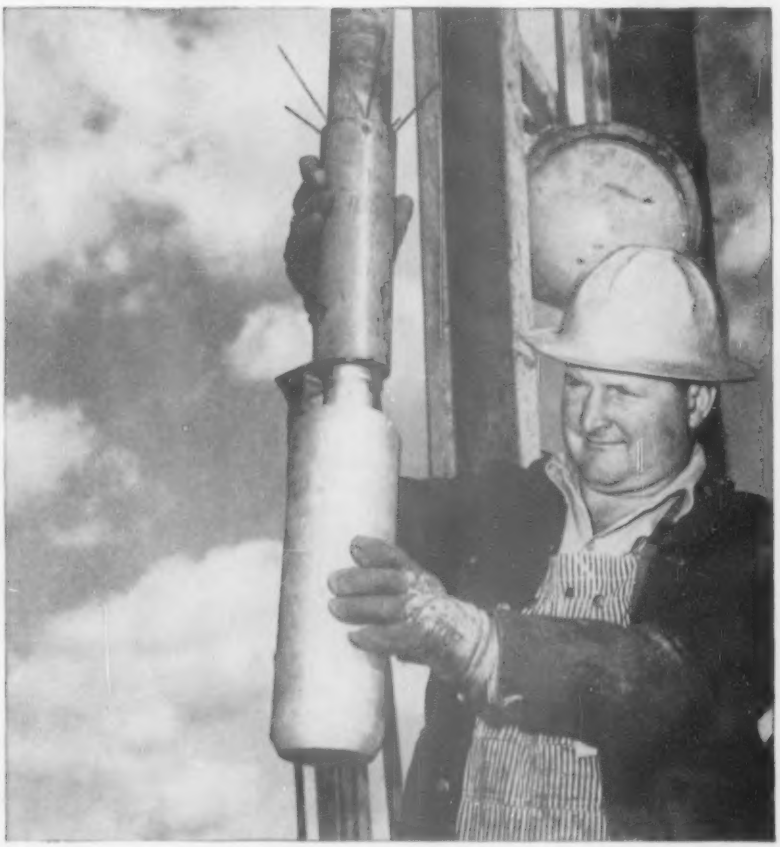

Type B Bridge Plug manufactured by the McCullough Tool Company. B. F. Goodrich Chemical Company supplies only the Hycar rubber.

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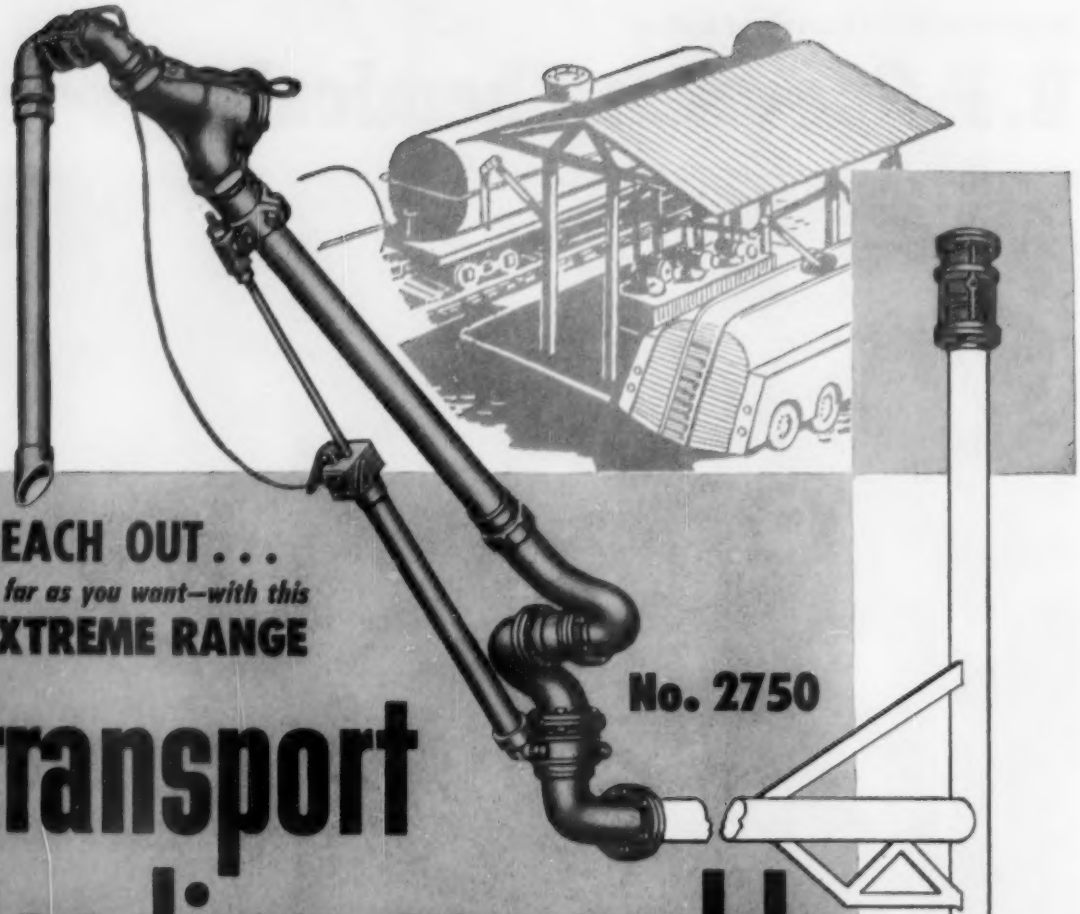

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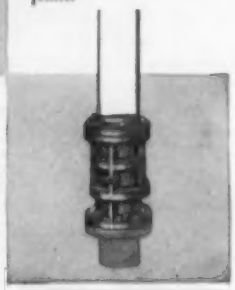

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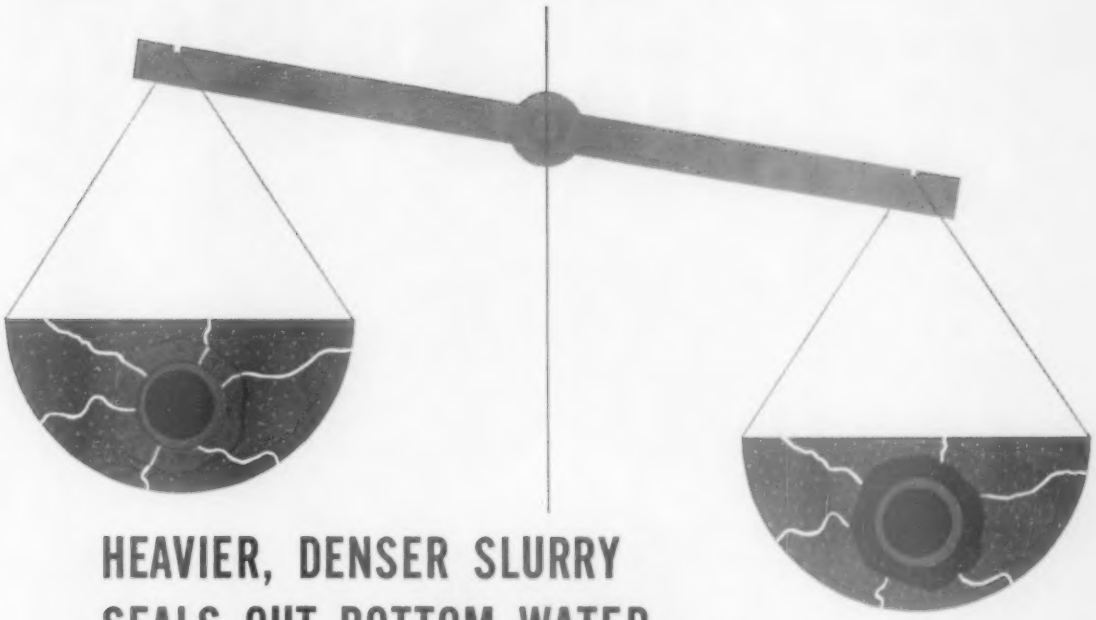

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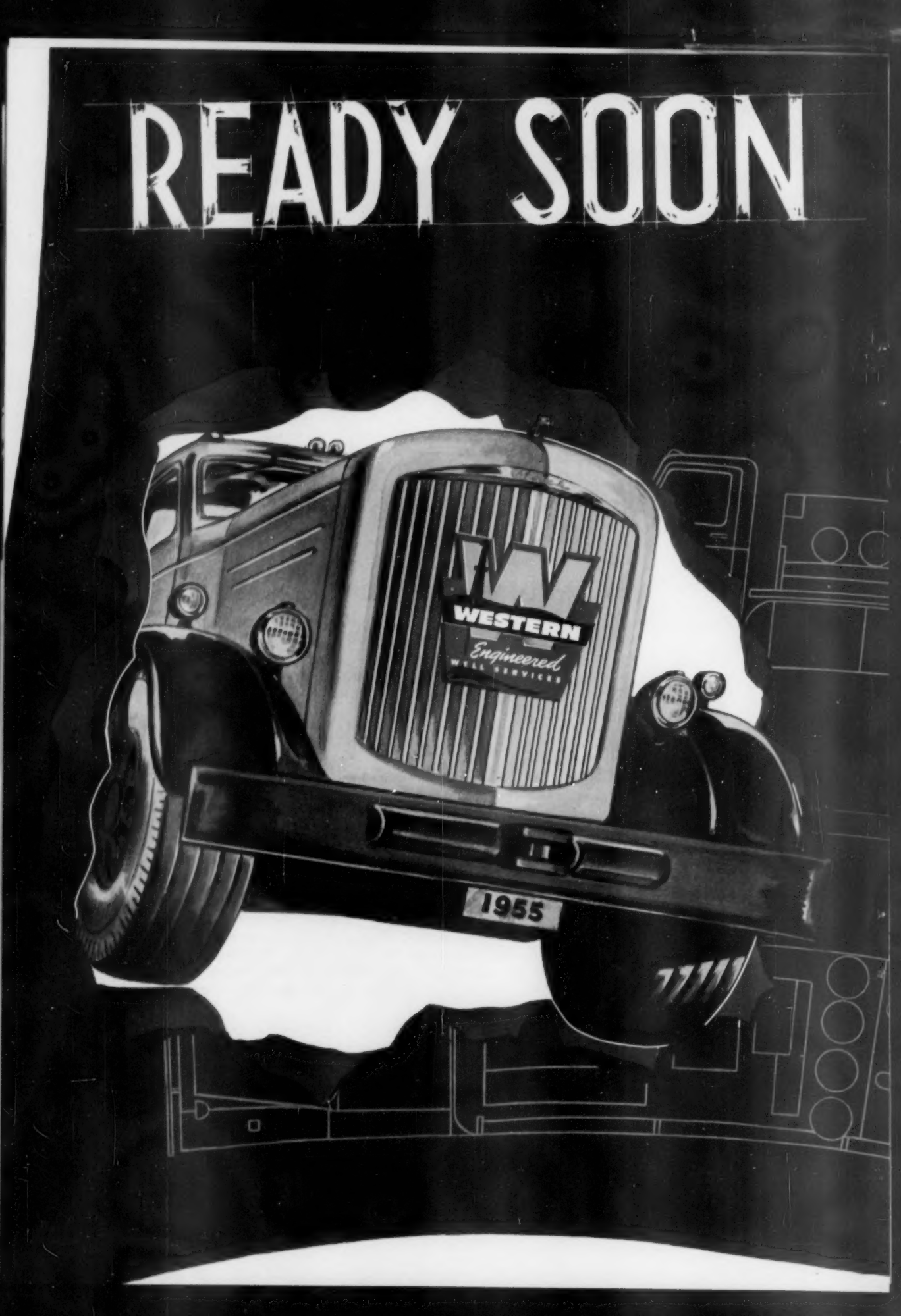

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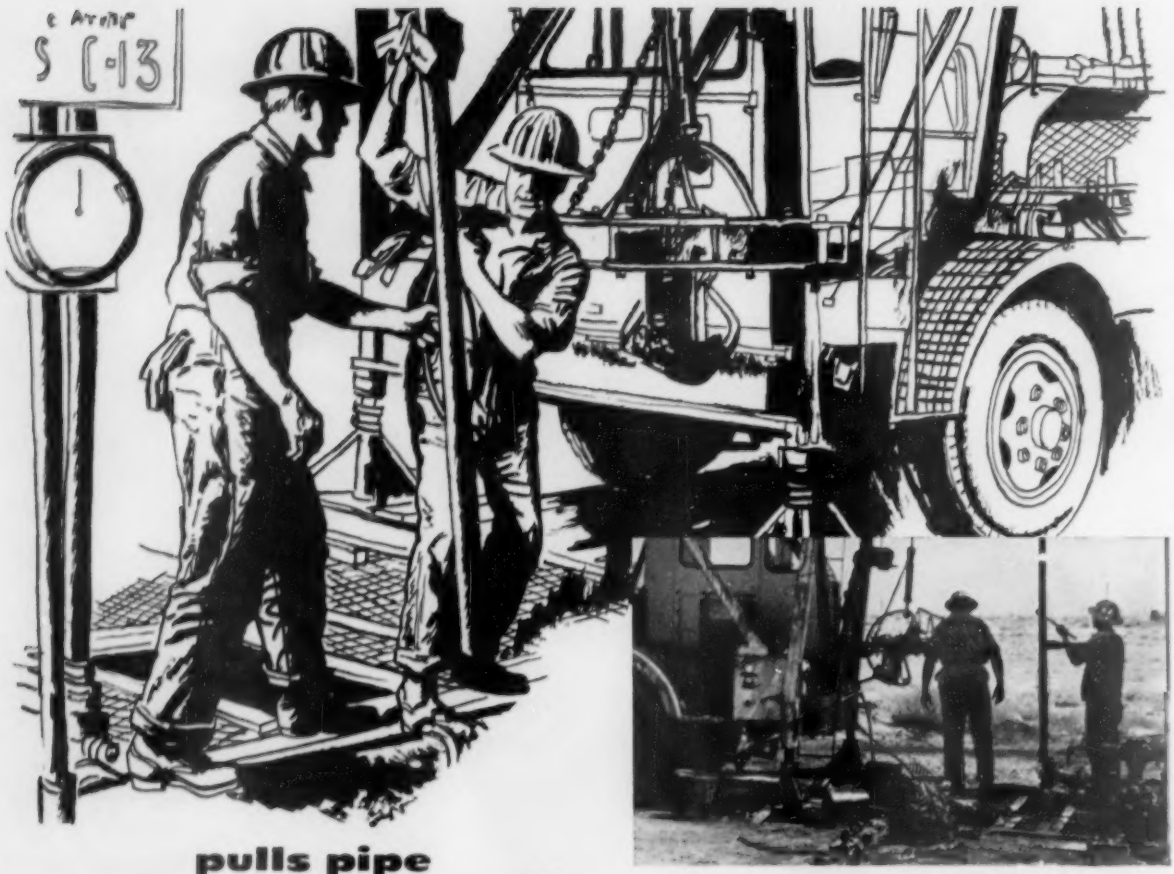

pulls pipe

Smooth as Steam

SETS UP IN TWENTY MINUTES-WORKS 30% FASTER

Richfield Oil Corporation operates five Allison TORQMATIC-equipped Hopper Machine Works units on its Bakersfield, California, leases. The first unit went into service more than four years ago. After more than 8,000 hours of trouble-free TORQMATIC operation, the oil company is well satisfied with its service.

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TORQMATIC DRIVES do *two* jobs in the Hopper Hoistmobiles —drive the drum and propel the unit on the road.

Over the hole, smooth as steam TORQMATIC operation protects pipe and sucker rod by absorbing shock loads. Smooth power transmission also prevents bent masts and other damage when a stand is "hung up" in the hole. And operators pull stands faster because they can come off bottom in low, then *quick-shift to high gear at full throttle* for faster pipe-pulling.

Over the road, the TORQMATIC DRIVES let the big Hoistmobiles travel at up to 45 miles per hour — walk away from regular trailer trucks on hills because the drivers make instant shifts with the throttle on the floor.

You can specify Allison TORQMATIC DRIVES in servicing, drilling and fracturing units made by most leading manufacturers. Ask your dealer, equipment manufacturer or write direct for full information to:

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SpringKore

Unretouched photograph of section of J&L SpringKore rotary drilling line worn out in service. Strand removed to expose coiled steel spring core. Note that core looks just like it did the day the rope was made except for faint indentations where wires of the inner strands nested against it for countless ton miles.

AN OBVIOUS IMPROVEMENT IN ROTARY DRILLING LINES

You can see and understand the difference.

The spring center makes this rotary drilling line resist high-speed bending and crushing.

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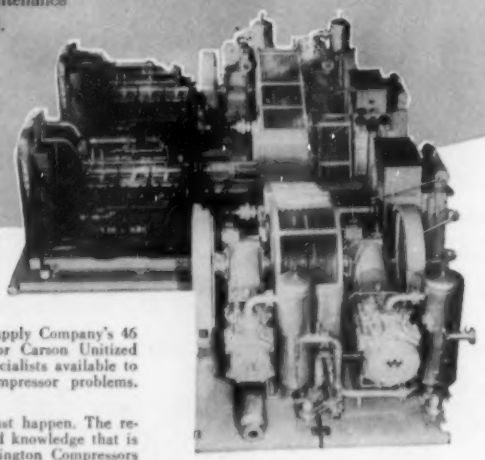
Serving The United States and Canada

106-S

Does Your Portable Gas Compressor Meet The Following Specifications?

YES	NO	
_____	_____	1. Controlled load and volume over wide range.
_____	_____	2. Pulsation dampener, standard equipment.
_____	_____	3. Phasing problem eliminated from multi-stage units.
_____	_____	4. Jackshaft deflection held to absolute minimum.
_____	_____	5. Oil lubricated pedestal bearing with Hi-Temperature shutdown switches.
_____	_____	6. Compressor drive designed to absorb and compensate for shock, and to reduce clutch, belt, coupling, and bearing trouble.
_____	_____	7. Conservative capacity ratings in MSCFD.
_____	_____	8. Engine and compressor matched on conservative BHP ratings.
_____	_____	9. Convertibility from single to multi-stage units, or vice versa.
_____	_____	10. Are inter and after coolers sized for 20°F ambient air differential?
_____	_____	11. Cooling system not subject to hot air recirculation.
_____	_____	12. Full automatic safety controls for unattended operation.
_____	_____	13. Complete turnkey installation from one company responsible for installation, replacement parts, field service and engineering.
_____	_____	14. Training service for maintenance and operating personnel.
_____	_____	15. Time finance plan.



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Contact any of Republic Supply Company's 46 stores and 12 sales points for Carson Unitized Gas Compressors. Trained specialists available to help you with your gas compressor problems.

A superior product doesn't just happen. The research, experience and applied knowledge that is constantly reflected in Worthington Compressors are big EXTRAS in oil field gas compressors. A choice of over 100 standard sizes for any pressures up to 1500 psig.

Carson MACHINE & SUPPLY CO.
OKLAHOMA CITY, OKLAHOMA

Anything less than the above set of requirements may mean more work, worry and trouble for you . . . expensive trouble when you can least afford it. Carson Machine and Supply Co. has been manufacturing custom built oil field equipment for over twenty years, servicing and guaranteeing every piece of equipment. Portable gas compressors for flare and recycling gas are available from 40 BHP to 275 BHP with operating pressures to 1500 PSIG, and guaranteed to meet or exceed the specified ratings. Write Compressor Division, Republic Supply, Company, Oklahoma City, or Compressor Division, Carson Machine & Supply, P.O. Box 4547, Oklahoma City, For Further Details.

EQUIPMENT ENGINEERS
AGRICULTURAL - INDUSTRIAL - MUNICIPAL - PETROLEUM

A complete 64-tank receiver and control station for remote liquid level gaging.

This new simplified digital gaging system remotely measures liquid levels in any number of tanks over a single wire pair of any length.

As illustrated, levels from the dialed tank are read from float-type gages and transmitted in precise digital form to the tank gage receiver. Tank number and level readings, in feet, inches and eighths, are displayed on easy-to-read lamp registers. Continuous monitoring or read-and-hold can be selected as desired. Optional features include automatic sequencing of tank selection, printed read-out by electric typewriter, and operation of card-punch apparatus.

Under the Bendix-Pacific unitized construction, these systems are comprised of standard assemblies offering maximum flexibility with low cost. Utmost reliability, freedom from error, and long-term unattended life are inherent qualities of the ELECTRO-SPAN system.

Engineering facilities are available for application of ELECTRO-SPAN to your specific requirements. Your inquiry is invited.

Please address inquiries to: Dept. 831

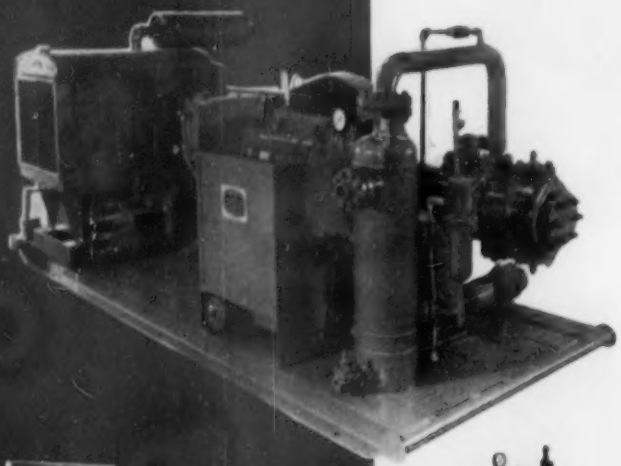
Pacific Division
Bendix Aviation Corporation
NORTH HOLLYWOOD CALIF

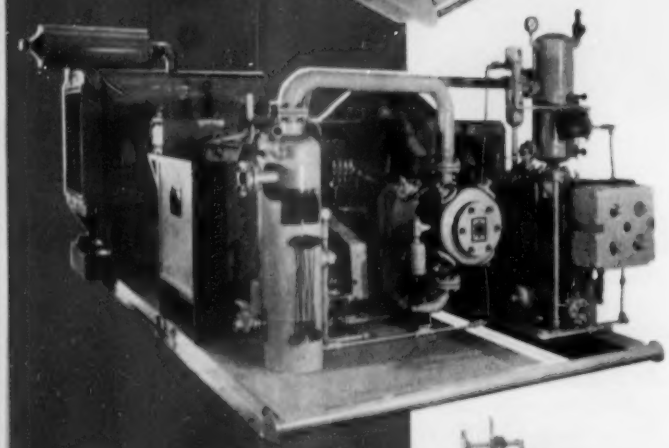
THE NAME Bendix AVIATION CORPORATION SYNONYMOUS WITH

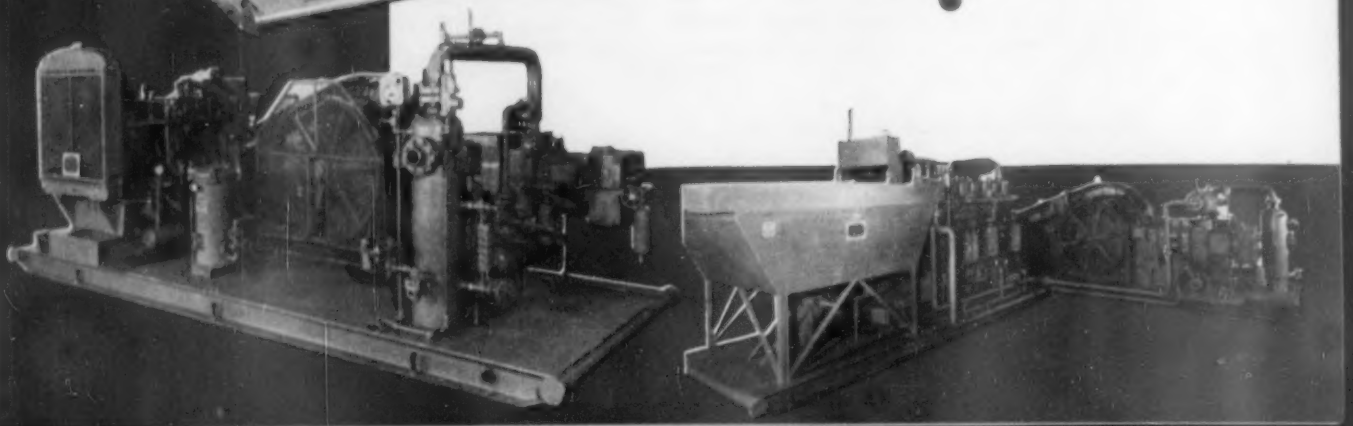
SIX REASONS WHY YOU

When You Buy

Wilson Supply—Ingersoll-Rand Packaged Portable Compressors are available in a wide range of capacities, and pressures for Gas Lift, Sales Gas, Repressuring, and Air Drilling. They are furnished in single stage, two stage or three stage units with a horsepower range between 25 and 300.







If your operation requires the use of a field Compressor installation—let the Compressor Engineers of Wilson Supply Company work with you to best solve your needs—no obligations, but every inquiry appreciated. Address Compressor Division, Wilson Supply Co., P. O. Drawer 19, Houston, Texas, or contact your nearest Wilson Supply Company store.

GET MORE FOR YOUR MONEY

A Wilson Supply—Ingersoll-Rand

Packaged, Portable COMPRESSOR

- ✓ The long experience of Wilson Supply Company in engineering and fabricating field compressors is reflected in today's trouble free installations.
- ✓ Every Wilson Supply—Ingersoll-Rand Compressor Installation is designed and engineered to do a Specific job—under the conditions that exist on that particular job.
- ✓ Every unit is so fabricated that only normal servicing is required—and such servicing can be handled by regular field personnel.
- ✓ Every unit is especially equipped with features to insure adequate cooling under all weather conditions based on the highest Ambient Temperatures of the location.
- ✓ Every unit is thoroughly tested by actual running under simulated operating conditions before leaving the Wilson Fabricating Plant.
- ✓ In event of emergency, you have available field engineers of Wilson Supply Company and Ingersoll-Rand—to keep shutdown time to a minimum.

●

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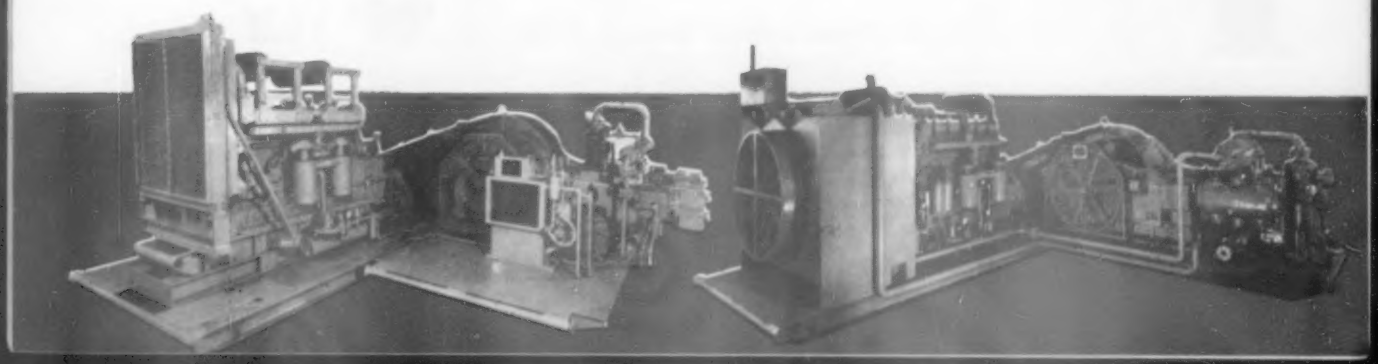
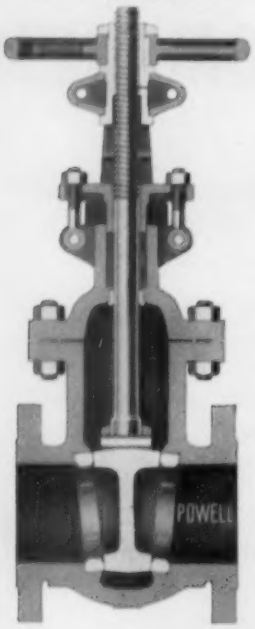


POWELL VALVES ... THE COMPLETE QUALITY LINE ... POWELL VALVES

FIG. 1503 (Sectional)—
150-Pound Steel Gate Valve.



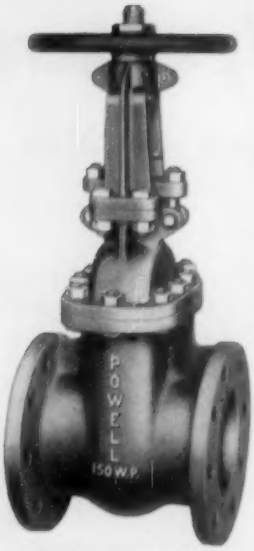
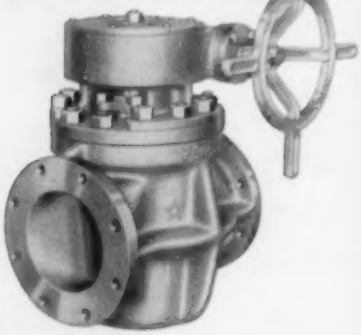


FIG. 2453-G—Stainless
Steel O.S. & Y. Gate Valve
For 150 Pounds.

FIG. 3059-G—300-Pound Steel
Lubricated Plug Valve. Gear Operated



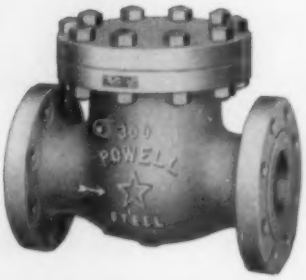


FIG. 3061—300-Pound
Steel Swing Check Valve.

POWELL VALVES ... THE COMPLETE QUALITY LINE ... POWELL VALVES

POWELL VALVES ... THE COMPLETE QUALITY LINE ... POWELL VALVES ... THE COMPLETE QUALITY LINE ...

Why Petroleum Engineers Specify Powell Valves ...

. . . . *because they know Powell Valves are dependable and economical.* Petroleum engineers also know that Powell has *the COMPLETE quality line of valves.*

Investigate the many outstanding features of the Powell Valves shown here . . . as well as *the complete line* of quality valves that have a proven record of long life and dependable service.

Consult your Powell Valve distributor. If none is near you, we'll be pleased to tell you about our complete line, and help solve any flow control problem you may have.

The Wm. Powell Company, Cincinnati 22, Ohio .....109th year

POWELL VALVES

THERE ARE MORE TON-MILES

IN EACH REEL OF

Yellow Strand®

WIRE ROPE

With longer, heavier strings of drill pipe, drilling costs are going up. But your wire rope costs can be held down . . . with Yellow Strand rotary lines.

A reel of Yellow Strand Wire Rope gives more ton-miles of service. Order that one reel of tough, flexible Yellow Strand from your nearby Continental store — the next time you string-up — and join the long list of consistent Yellow Strand users!

FAST SERVICE . . .

is another Yellow Strand feature. Continental Supply Company stocks Yellow Strand — in the grades, sizes and construction you need — at each of its convenient stores. Phone your order for immediate attention.

CONTINENTAL

Serving the Oil and Gas Industries

THE CONTINENTAL SUPPLY COMPANY

General Offices: **DALLAS, TEXAS**

Representatives in All Principal Oil Fields of the World

THERE'S NO

MAGIC

IN NEW BEDFORD

...IT'S JUST THE

WORLD'S BEST ROPE

If there could be magic in rope, New Bedford would have it! The only performance claim for this pure manila cordage is day-in, day-out dependable service with longer life under severest treatment. "There's None Better" than New Bedford. At your Continental store.

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CONTINENTAL

Serving the Oil and Gas Industries

Success... hangs by a thread

Failure of tool joint threads *can* cause costly catastrophes: replacement of tool joints and drill collars damaged by galling or freezing; expensive fishing jobs when the drilling string breaks at the joint; lost hole, down time and sometimes even side tracking when recovery is impossible. *All this can happen because of the failure of a tool joint thread.*

That's why it pays to pamper tool joint and drill collar threads with WECO NO-GALL and LO-TORK — the finest compounds made. They assure maximum gall resistance — lubricating without freezing — and minimize risk of thread failure.

Since WECO Compounds represent but a fraction of drilling cost — yet can save you so much money by prolonging tool joint life, reducing down time — it's just sound economics to use WECO Compounds on your tool joints and drill collars.

C-3-55

it's wise to standardize with.. **WECO**

WECO®

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The Right Men and Equipment for any Drilling Job...
ON LAND AND AT SEA
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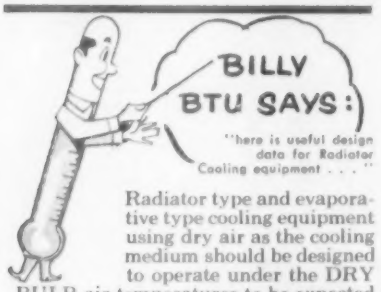
Young Heat Transfer News

YOUNG RADIATOR COMPANY, RACINE, WIS.

Seven Times More Heat Transfer Surface Provided by New Young *Monofin* Core



Radiator type and evaporative type cooling equipment using dry air as the cooling medium should be designed to operate under the DRY BULB air temperatures to be expected during the summer in the locality where the equipment is to operate. Equipment using cooling effect due to water evaporation is designed to operate under the WET BULB air temperatures to be expected.

For proper design, it is not satisfactory to use either the maximum air temperature, nor the average air temperature. Use of the maximum air temperature for design would result in the selection of cooling equipment too large to be economical, since it would be fully loaded only under the most extreme temperature conditions. Use of average temperature for design purposes would result in selection of equipment too small to handle the cooling load during a great portion of the operating time. It is necessary, therefore, to use some figure between maximum and average air temperatures.

The Young Radiator Company has prepared and offers to engineers engaged in the design and application of radiator type and evaporative type cooling equipment, data taken from the results of five years of summer records in the United States. This data may be used and considered as applying to an average year.

For a copy of this data, write for Bulletin 654, Young Radiator Company, Racine, Wisconsin.

WRITE FOR FREE DESIGN TEMPERATURE BULLETIN OF THE UNITED STATES

Helpful four-page Bulletin briefly discusses atmospheric cooling equipment design temperatures for the United States. Wet and dry bulb maps are fully illustrated with isothermal lines. Write Young Radiator Company, Dept. 205-D, Racine, Wisconsin.

Monofin offers more contact surface than circular type fins.

Monofin core, the most modern development in extended surface heat transfer, has seven fins per inch to provide 58 per cent more extended surface and 7 times more heat transfer than circular fin cores with edge contact.

Comparing cores using tubes of same size and thickness with 1-7/16" diameter, circular fins versus 1-7/16" *Monofin* . . . and with both fins .013 inch thick, note these differences —

Regular circular fins have 2.8 square inches extended surface per fin, while *Monofin* has 4.418 square inches per fin!

Monofin finned tubing is available with aluminum or copper fins, with various fin spacings for special applications.

Tube materials are copper, brass, steel or aluminum. Outside tube dimensions are ½", ⅝", ¾" and 1".

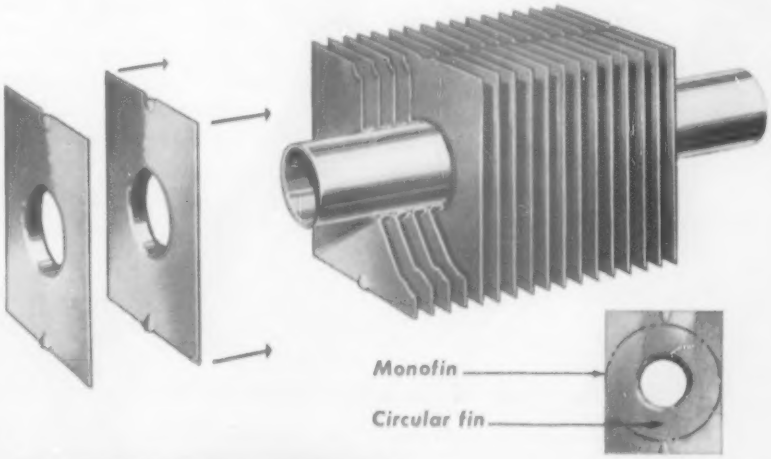
Monofin design advantages include more bursting strength with fin collar contact which completely encases the tube, protecting it from injurious impingement and atmospheric corrosion.

Straight in-line fins permit ease of air flow which causes less turbulence and resistance for greater fin cleanliness.

Monofin mechanical bond to the tube resists hot and cold cycles and will not loosen tube-fin assembly. Another important consideration is that tubes sheathed with *Monofins* are removable when damaged.

For further details, write for *Monofin* illustrated Bulletin.

Monofin is a Young Radiator Company trademark.



Young RADIATOR COMPANY

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Heat Transfer Products for Automotive, Aviation and Industrial Applications.

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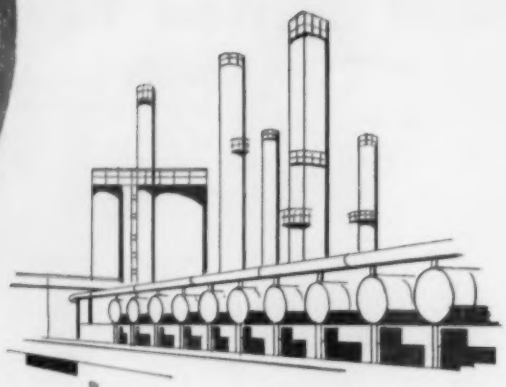
here.....

a pressure drop is annoying



here.....

a pressure drop is expensive

IT PAYS TO LOOK AT THE ADVANTAGES OF USING GLOBE SEAMLESS WELDING FITTINGS

Welded Construction Takes Less Space — Piping can be nested in corners, or fitted against ceilings, walls or equipment. Dimensional accuracy permits cut-offs at odd angles when necessary.

Whole Sections Can Be Shop-Fabricated — For fast installation, or where working space is limited, entire sections can be shop-fabricated and installed by any qualified welder in a few minutes.

Welded Construction is Easily Insulated — Insulation is simplified by the absence of complex flanged assemblies. Because joints are leakproof, insulation is permanent and maintenance free.

Welded Construction is Permanent — Maintenance costs are kept at a minimum because piping is permanent and leakproof. The strength of the weld approaches that of the pipe itself.

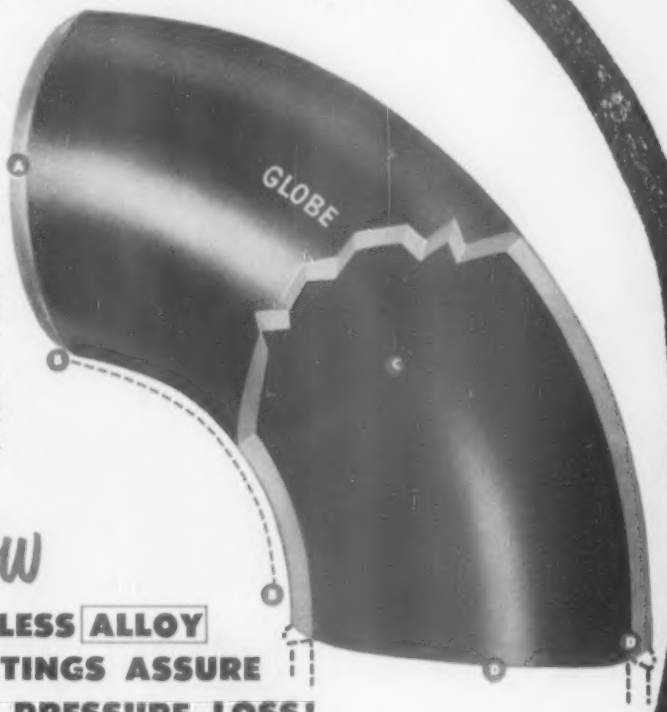
Welded Construction is Simple to Install — Dimensional accuracy of angles, radii, and bevels, assure quick and easy joining. Any qualified welder can do the job efficiently and economically.

Welded Construction is Lightweight — Strength combined with lightweight permits easy handling in installation. Unwieldy sections can be joined on the ground, and then fastened into position.

District Sales Offices: BEAVER FALLS, PA. • BOSTON 16, MASS. • CHICAGO 3, ILL. • CINCINNATI 6, OHIO • CLEVELAND 14, OHIO • DETROIT 26, MICH. • HOUSTON 19, TEX.

COMPARISON PROVES THE PRACTICALITY OF GLOBE WELDING FITTINGS

These 4 factors increase friction, create turbulence and consequent erosion and cause pressure drop. Note how they are eliminated with welded construction using Globe Alloy Welding Fittings.



A CIRCULARITY — True circularity throughout insures accurate alignment when special odd-angle sections are cut. Full diameter throughout protects against pressure loss due to flattened or angular surfaces.

B RADIUS—Uniform gradual change of direction provides smooth even flow — less resistance to directional changes.

C SMOOTH INNER WALLS—No waves or ridges within the fitting to impair flow — no buckling of metal along the short inner curve — no stretching on the outer curve. This also prevents premature piping system failure.

D SMOOTH JOINTS — Uniform wall thickness, machined bevel ends, and perfect agreement between fitting and pipe sizes assure automatic and perfect alignment. The smooth welded joints present no interruption to flow.

here's how

GLOBE SEAMLESS ALLOY WELDING FITTINGS ASSURE MINIMUM PRESSURE LOSS!

Welding Fittings remove all "road blocks" from the flow of material. They present a gentle transition in contour, smooth inner walls free of pockets or crevises within the joints. Flow of material is speeded, erosion due to turbulence is minimized adding years to the life of the piping system.

This efficient piping flow reduces maintenance costs, reduces pumping power requirements and investment in equipment.

Globe Seamless Welding Fittings

GRADES: Carbon, Alloy and Stainless Steels.

TYPES: Elbows, Tees, Caps, Saddles, Laterals, Nipples, Returns, Flanges, Stub Ends, Reducers, Crosses, Bull Plugs.

SIZES: Complete range of sizes and schedules.

THE *NATURAL* SOURCE FOR ALLOY FITTINGS

B&W TUBULAR PRODUCTS DIVISION

THE BABCOCK & WILCOX COMPANY

TUBULAR PRODUCTS DIVISION • FITTINGS DEPARTMENT

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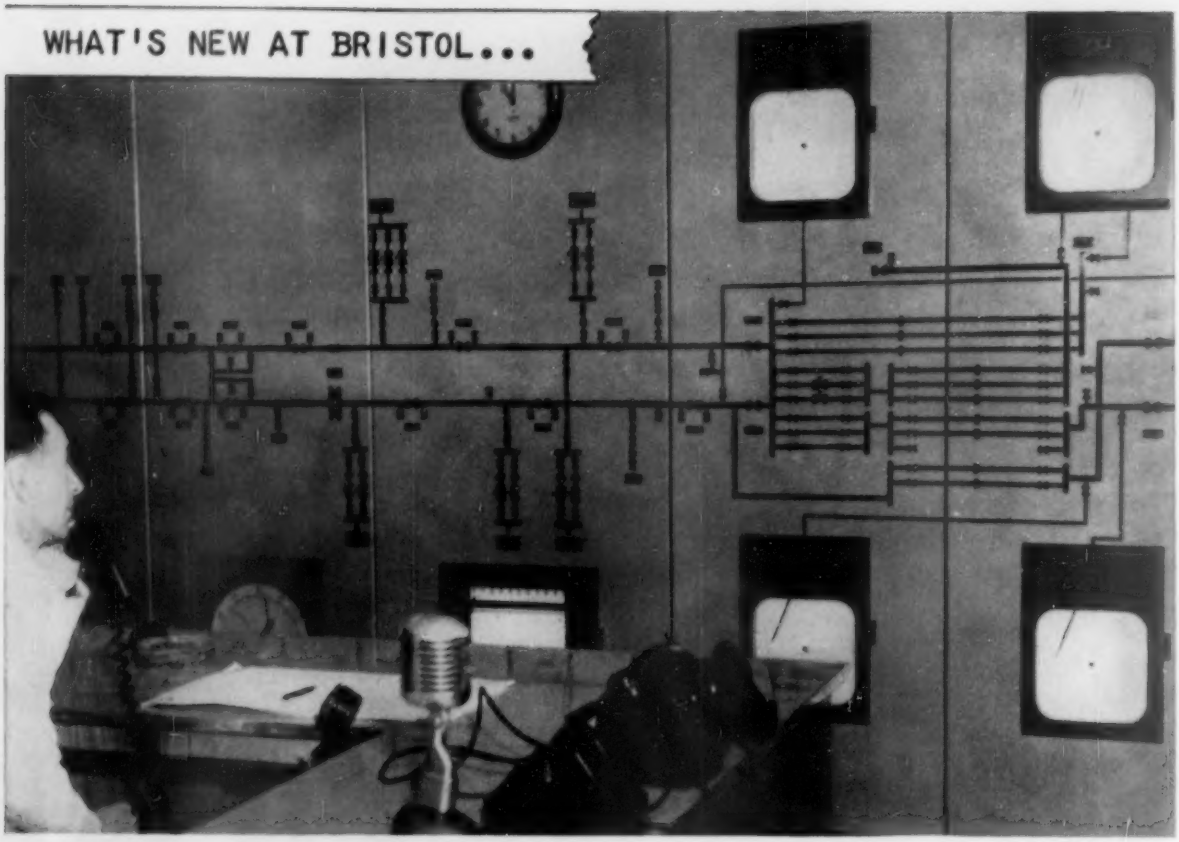
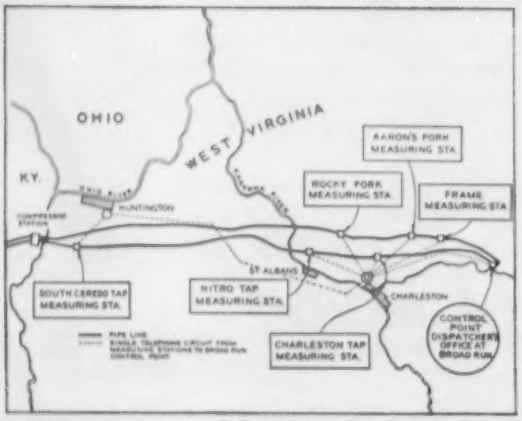
WHAT'S NEW AT BRISTOL...



Now you can dial for pressure readings



MAP SHOWS extent of Tennessee Gas Transmission Company's remote operations — all controlled through a Bristol Metameter Telemetering and Remote Control system over a single 74-mile circuit.

You're looking at the field dispatcher's office in the Broad Run, W. Va., station of the Tennessee Gas Transmission Company.

From this point, TGT controls the pressure, flow, and metering at six delivery points spread along a distance of 74 miles in the mountains of West Virginia. This control is accomplished with the help of a group of Bristol Metameter® Telemeters, *which supervise a total of 51 functions, over a single 74 mile telephone circuit.*

Wide demand variations make it necessary for Tennessee Gas to transfer as much as 3500 MCF of gas per hour from one point to another, on the request of the customer's dispatcher, at any hour of the day or night.

To accomplish this, the field dispatcher dials in any desired location, and reads the value of the measured function on his Metameter Telemeter receiver. By dialing the proper function, he can also remotely vary the flow controller on each meter tube, from no-flow to maximum flow.

Bristol has become the acknowledged leader in the telemetering field, in the opinion of thousands of leading companies throughout the country. Our bulletin M1710 tells why. Write for it today. The Bristol Company, 120 Bristol Road, Waterbury 20, Conn. 5.1

*Reg. U.S. Pat. Office

TRADE MARK BRISTOL'S REG. U.S. PAT. OFFICE

BRISTOL

POINTS THE WAY IN HUMAN-ENGINEERED INSTRUMENTATION

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

When water-blocks stop profits

...call on

ATPET® 931

When water blocks oil flow . . . you leave money in the ground! If this happens, treat your well with ATPET 931. It's the economical, fast, chemical way to restore production of water-blocked wells. It is also valuable in completing wells that are subject to water damage, and is an assistant in fracturing and acidizing jobs.

Produced by Atlas, the world's leading producer of surface active agents, ATPET 931 is an exceptionally effective interfacial tension depressant. About 1% of it in field crude charged into the well breaks down the water barrier, and allows normal flow to resume.

PAYOUT TIME IS IN DAYS instead of months. Average treatment costs less than $500. No special pumping equipment is needed.

SCORES OF SUCCESSFUL TREATMENTS prove its value. It's recommended by many service companies, for its efficiency and economy. Nearly half of all applications tried have resulted in definite increases in production.

INSIST ON ATPET 931 . . . for field-tested efficiency and low cost. Ask your nearest Atlas office or your service company for full facts.

Call any of these ATLAS OFFICES:

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3272 Westheimer Road
Justin 5561

ST. LOUIS, MO.
3615 Olive Street
Jefferson 3-2538

LOS ANGELES, CALIF.
411 W. Fifth Street
Michigan 8896

CHICAGO, ILL.
135 La Salle Street
Franklin 2-9530

SAN FRANCISCO, CALIF.
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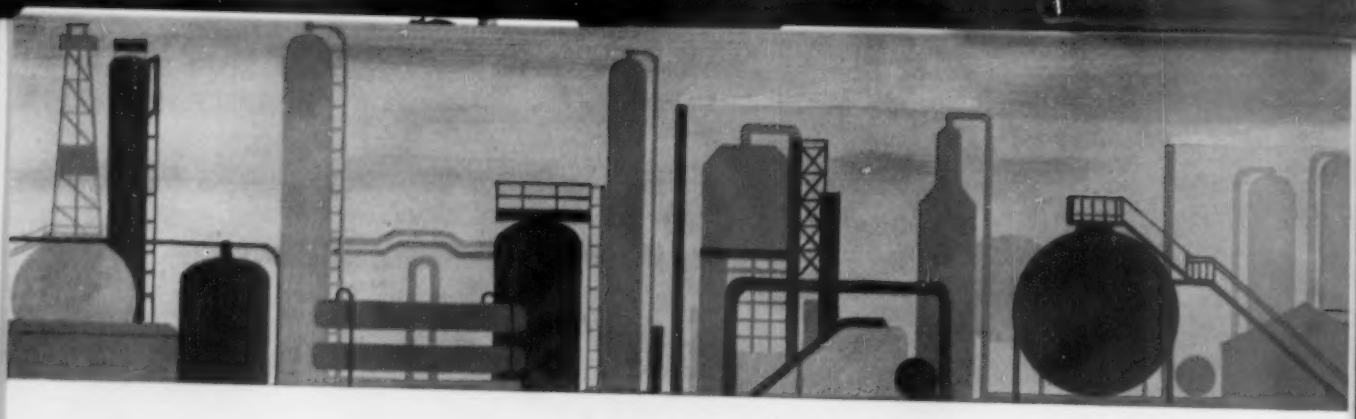
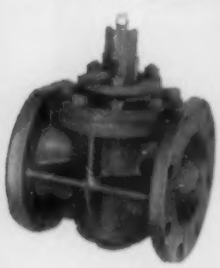


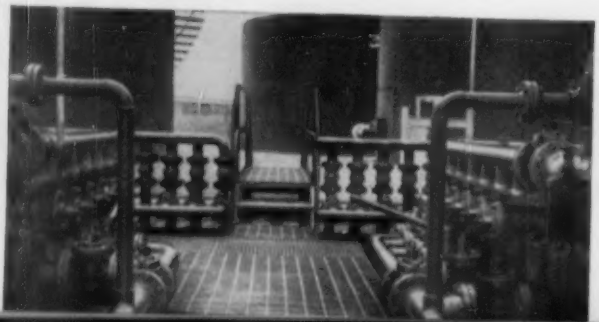
Where It PAYS To Use

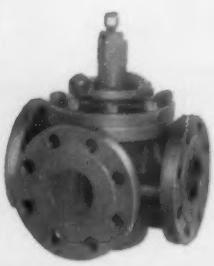
REFINERY VALVE CHECK LIST

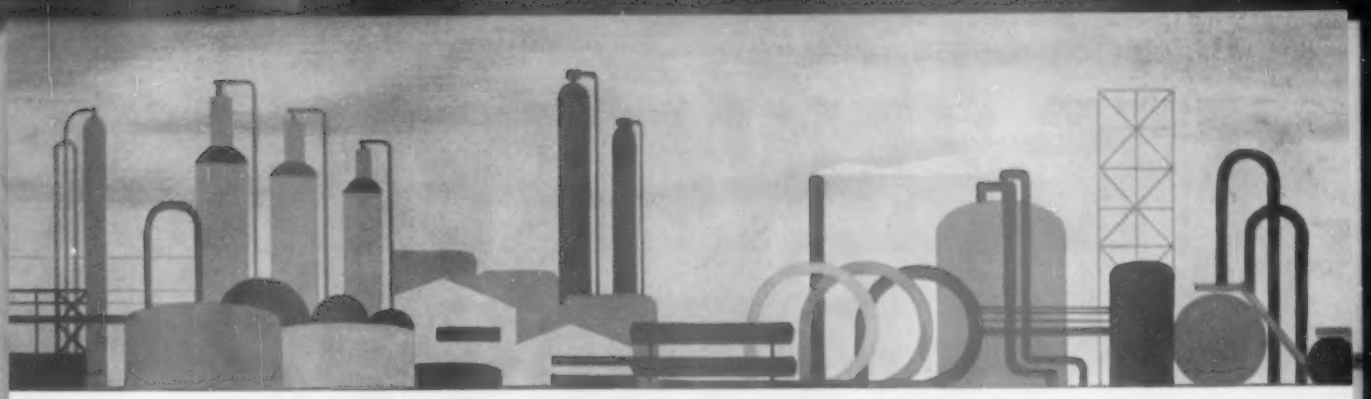
Where To Use ROCKWELL-NORDSTROM Valves

- ☑ Transfer Lines
- ☑ Crude Lines To Refinery
- ☑ Heater Lines
- ☑ Towers
- ☑ Relief Valve Settings
- ☑ Lube Oil Treating
- ☑ Blending Lines
- ☑ Dewaxing
- ☑ Filtering
- ☑ Solvent Extraction
- ☑ Products Lines
- ☑ Tank Farms
- ☑ Loading Racks
- ☑ Fuel and Supply Lines
- ☑ Cat Crackers
- ☑ Platforming Units









Rockwell-Nordstrom Valves

For The Most Economical, Trouble-Free Refinery Valve Service

Look very carefully at the refinery valve check list on the left. If you are not now using Rockwell-Nordstrom valves at these important points, you have a real opportunity to make worth-while savings through longer, more trouble-free valve life, and lower repair, replacement and down time costs. Here are the reasons:

ECONOMICAL: Rockwell-Nordstrom valves are the most economical refinery valves you can use. Pressurized lubrication—which forms the time-proven leakproof seal—also eliminates metal-to-metal friction and "armor plates" the working parts against corrosive or erosive line material. And the valve seats, the parts that are "eaten out" fastest on ordinary valves, are *never* exposed to line material.

Rockwell-Nordstrom valves will start saving money for you the day they go on-stream because lubrication and rugged design eliminate costly repair and replacement and assure longer economic valve life.

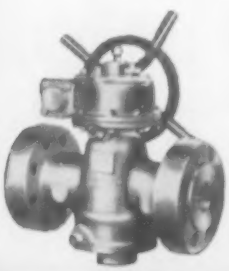
TROUBLE-FREE: Refinery engineers have been standardizing on Rockwell-Nordstrom valves for forty years. They've learned that the pressurized lubricant seal and positive shut-off assure *safe*, leakproof operation in *any* refinery service. Refinery operations men prefer Rockwell-Nordstrom valves because quarter turn closure permits accurate, smooth flow control. There are no bulky, large open cavities on Rockwell-Nordstrom valves; they require less space in manifolds. "Open-Close" guess work is eliminated—a glance at the wrench instantly tells plug position.

Rockwell-Nordstrom valves are available in *the only complete range* of lubricated plug valve sizes and pressure-temperature ratings in steel, semi-steel and corrosion resisting alloy patterns. Write for complete information today: Rockwell Manufacturing Company, Pittsburgh 8, Pa.

Canadian Valve Licensee: Peacock Brothers Limited

ROCKWELL-Nordstrom VALVES

LUBRICANT SEALED FOR POSITIVE SHUT-OFF



THE NEW GILBARCO ELECTRONIC TANK GAUGE

MEASURES THIS ACCURATELY...

The Gilbarco Electronic Tank Gauge gives you accuracy to within *1/16th of an inch plus or minus* — the thickness of a quarter! This gauge actually measures electronically — not with a float. It is the only gauge today that offers you all these time- and money-saving advantages:

★ At least 100% more accurate than hand gauging, or any other automatic gauge

★ Capable of remote transmission with equal accuracy

★ Equipped with positive operational checks for assurance of accurate performance

★ Can be supplied with *automatic switches* for selecting proper resistance in averaging temperature instruments.

***Automation* in Liquid Level Gauging is brought to Refineries, Pipe Lines and Terminals with the Gilbarco Electronic Gauge.**

Write now for illustrated brochure with full details.

Gilbert & Barker Mfg. Co.
West Springfield, Mass.

Gentlemen:

Please send me brochure on the Gilbarco Electronic Tank Gauge.

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COMPANY_____

ADDRESS_____

CITY_____ STATE_____

Gilbarco

Gilbert & Barker Mfg. Co.,
West Springfield, Mass.,
Toronto, Canada

SLAM! IMPACT! RATTLE

Martin Rubber Guide Cages Take the Terrific Punishment . . . Give Longer Life . . . Cut Repair Costs!

Resilient Synthetic Ball Guides Do Not Beat Out
Rubber Guides Prevent Ball Nicks
Longer Ball and Seat Life Assured
Cages Made of Steel, Brass, Stainless Steel or Monel as Required for Corrosion Resistance
Non-Magnetic. Helps to Prevent Electrolysis
Replaceable Guides, Easy to Replace if Ever Necessary

How would you like to receive 50 million small hammer blows? . . . Well, that's just how many times the ball chatters against the guides of a Martin Cage in one year. Where other cages are beaten and worn out by this punishment, Martin Cages are little affected. The secret of Martin Cage's long life is the rubber ball guides. The resilience, resistance to sand abrasion, nonmagnetic character, and electrical resistance of this rubber guide successfully combat cage problems . . . Yes, you'll solve **your** cage problems with a Martin Cage . . . the finest cage made today!

Order Martin Cages and Plungers Through Your Supply House.

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To provide faster service in one of the oil industry's most important areas we have equipped Mid-Continent Supply Company stores and field offices in Oklahoma with mobile two-way radio. This forward step is one more reason why it pays to call Mid-Continent for sure service, sure supply.

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THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

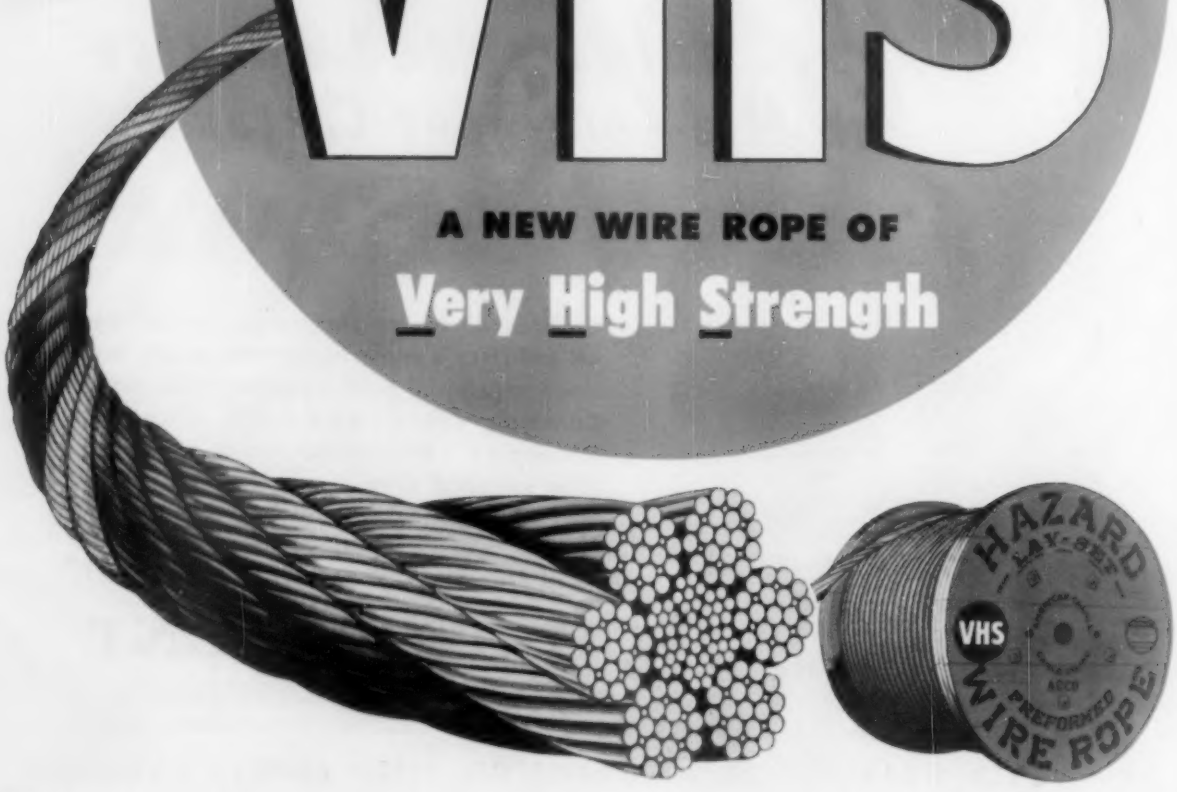
HAZARD WIRE ROPE

Proudly Announces

LAY-SET VHS

A NEW WIRE ROPE OF

Very High Strength



Developed for the TOUGHEST JOBS

Until very recently, certain confidential military applications have consumed almost all of our available production of LAY-SET VHS. However, since World War II a limited amount has been field tested in certain specific commercial applications.

Now you can get LAY-SET VHS for seven major uses—for scrapers, bull-dozers, drag lines, shovel hoist ropes, logging arch lines and chokers, rotary drilling lines and slushers. These applications are among the toughest wire rope has to meet. The unusual demands they make on wire rope dictate the use of VHS.

Costs Less to Use

Because it lasts longer and cuts "down time" for replacement, VHS wire rope costs less to use. It increases work output. Since it is stronger and tougher, it reduces the footage of rope you need to buy to operate your equipment.

Carefully kept service records on actual field tests in the applications mentioned above prove the greater economy of LAY-SET VHS.

At Least 15% Stronger than Other Grades

VHS is a new grade of steel for wire ropes. It is at least 15% stronger than Improved Plow Steel, which up to now, has been the strongest standard grade of wire rope manufactured.

This means that in some applications you may be able to use smaller lines to carry the same load. In other applications you may be able to carry heavier loads with lines of the same size.

Tougher Rope for Longer Life

In addition to being stronger, the new VHS wire is tougher and more wear-resistant. It offers greater resistance to abrasion. It keeps its shape under pressure . . . can't become "hide bound" or lose its flexibility.

This extra toughness and wear-resistance means longer service life . . . and less "down time" of equipment for rope replacement.

Biggest Improvement Since LAY-SET Preformed

LAY-SET VHS is the greatest improvement in wire rope since ACCO introduced Preformed over thirty years ago. It combines greater strength and toughness with all the advantages of Preformed construction. As proven in actual field tests, it lasts longer and does more work with less "down time" for replacement.

Find out how you can reduce service costs by using LAY-SET VHS on all of the applications mentioned above.

See your Hazard distributor or write to the nearest office listed below for brochure **DH-490.**

HAZARD WIRE ROPE DIVISION
American Chain & Cable Company, Inc.

PLANTS: Houston, Tex., Wilkes-Barre, Pa.
OFFICES AND WAREHOUSES: Odessa, Tex., San Francisco, Portland, Ore., Pittsburgh, Philadelphia, New York, Los Angeles, Denver, Chicago, Atlanta • Bridgeport, Conn.

You can do it CHEAPER with UTILITY Electric Power

Your Electric Power Company STILL provides the BEST POWER SERVICE at a MINIMUM COST!

Wherever Power is needed, your Electric Power Company will get that power to the job... modern, dependable Electric Power that is efficient and economical. Be sure of power when and where you need it... but make it Electric Power.

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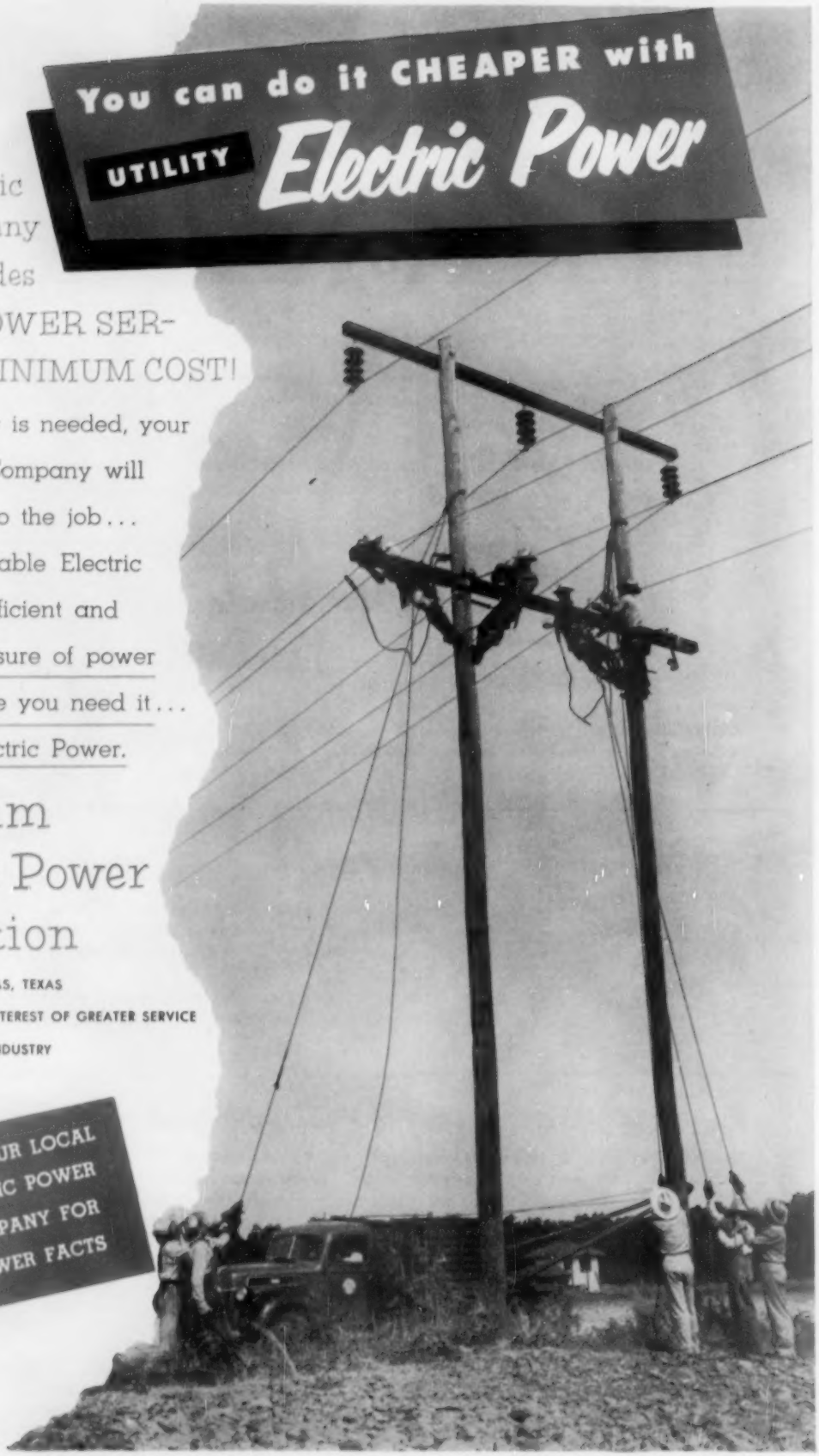
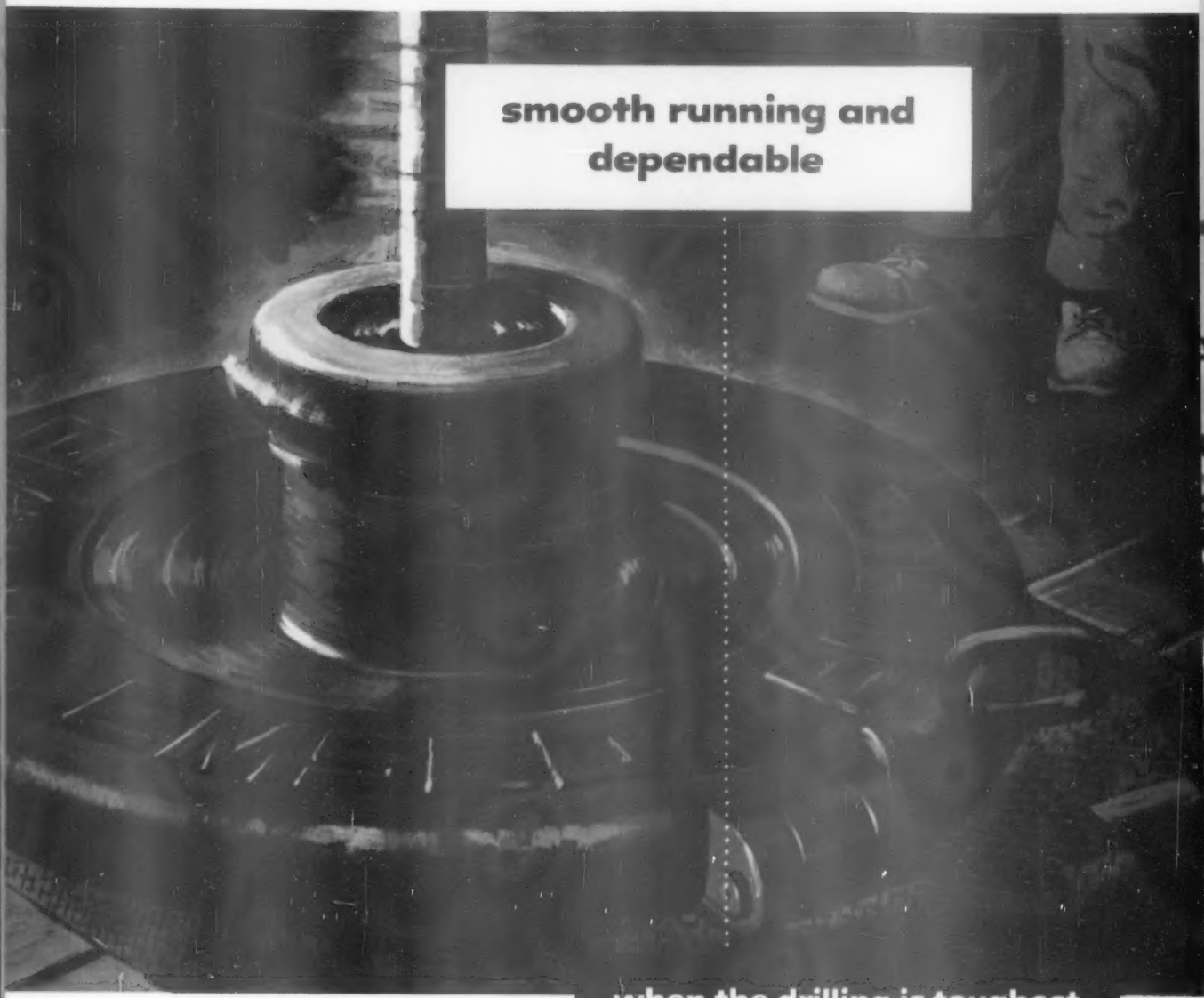
ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

CALL YOUR LOCAL ELECTRIC POWER COMPANY FOR POWER FACTS





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EMSCO MANUFACTURING COMPANY

Garland, Texas LOS ANGELES, CALIF. Houston, Texas

General Sales Offices: Dallas, Texas

Superior design and construction of Emsco P Rotary Machines assure quieter, smoother, longer-lasting performance.

Bearings and gears are completely protected from tonging shock. A table-locking lever engages notches in the table top flinger and locks the body only, thus the shock load is not transmitted through bearings and gears.

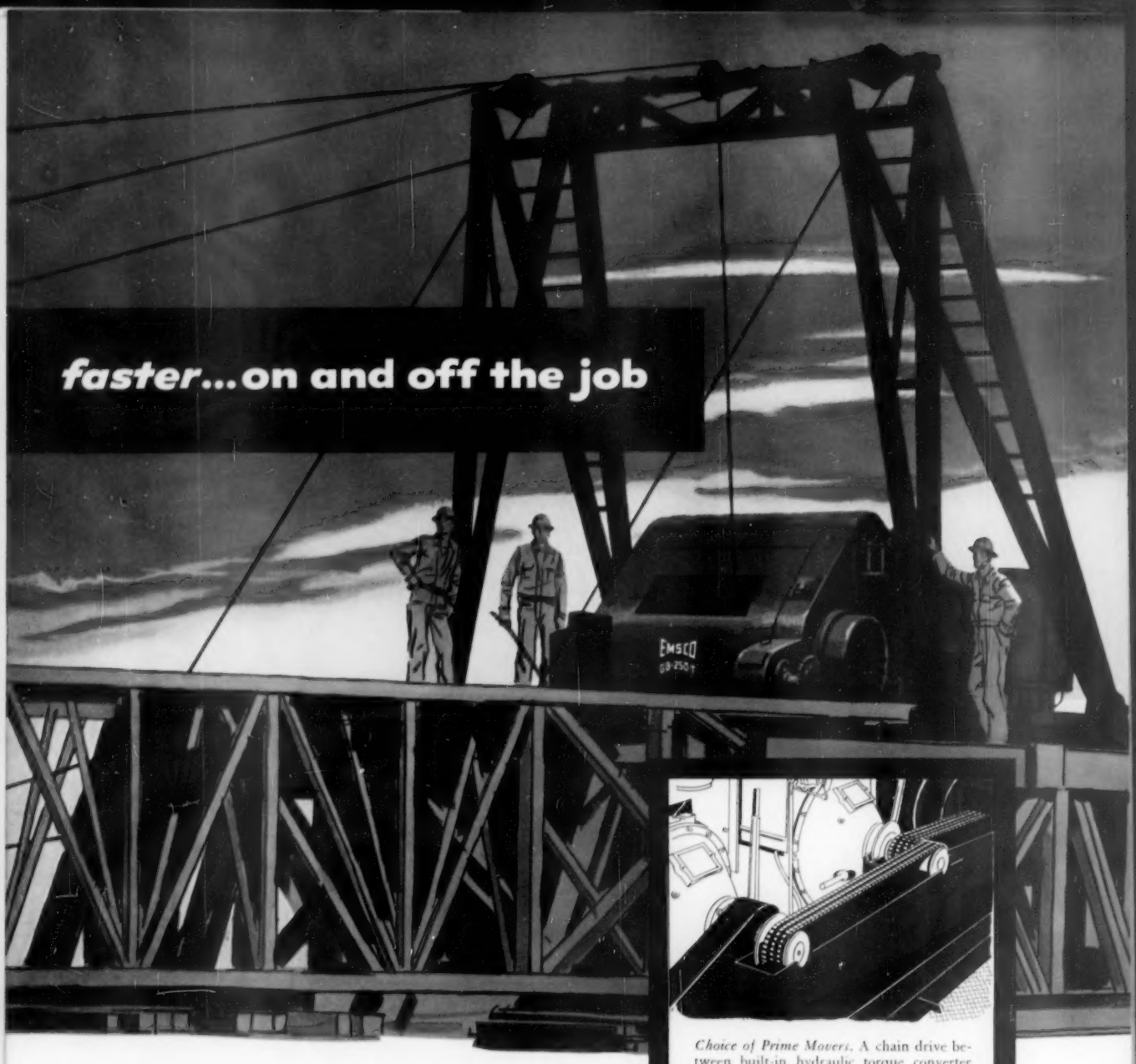
Emsco P Rotaries are effectively sealed from entry of mud or other foreign material. A mud flinger underneath the circular guard throws the mud away from the table center, thus preventing it from getting within the walls of the box.

All P Rotaries are equipped with flame hardened, precision-machined spiral bevel gears. Strong, rectangular fabriform cases make flooring-up simple and easy.

An efficient flood lubrication system is provided from a large central, sealed oil reservoir. Pinion bearings are independently grease lubricated.

Call CONTINENTAL for detailed information on these outstanding Emsco P Rotary Machines. Available in three sizes: 17½", 20½" and 27½".

E-192F-55



faster...on and off the job

Choice of Prime Movers. A chain drive between built-in hydraulic torque converter and engine (or engines) gives the operator complete freedom of power selection.

EMSCO's Little Rigs, GB-160-T and GB-250-T, are rugged, lightweight and completely portable... get you on and off the job faster.

Rig-up time is substantially reduced. EMSCO Little Rigs are packaged as a unit and can be moved without breaking oil or air lines.

Designed for shallow to medium depth wells, servicing and deep workover, these smooth running torque converter rigs have big rig features. An inboard-mounted torque converter, driving through a two-speed selective transmission, provides an infinite range of speeds and permits use of maximum obtainable horsepower at any time.

Controls are in a forward-mounted console, with one-lever control valves for hoisting and rotating. Friction clutches are direct air-operated. Neutral brakes provide greater safety and ease of operation. Call CONTINENTAL for details on EMSCO's dependable GB-160-T and GB-250-T.

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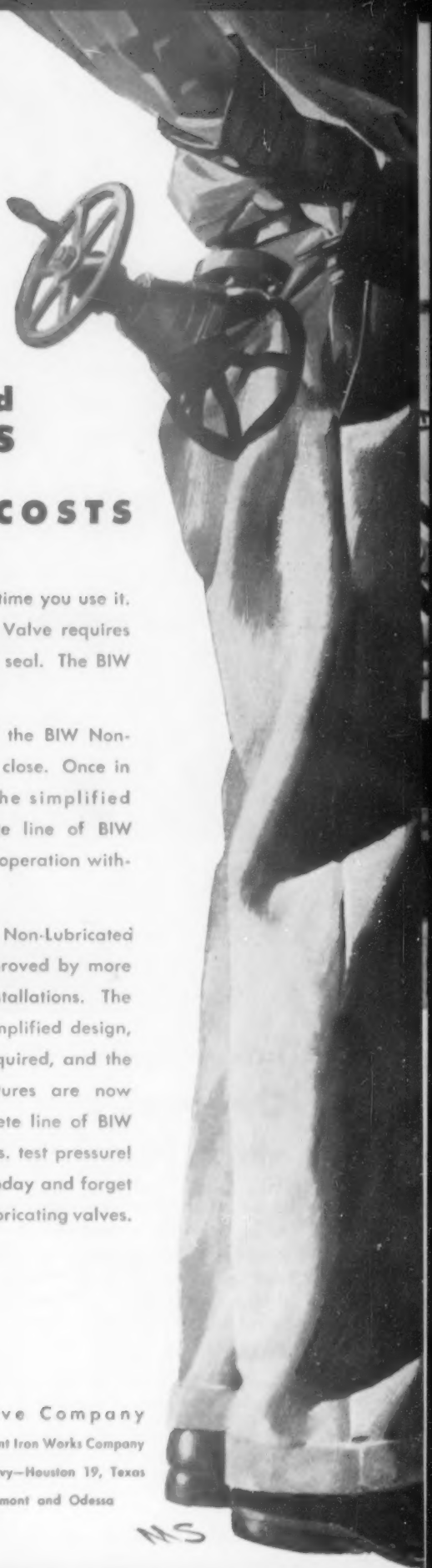
MONEY IN YOUR POCKET

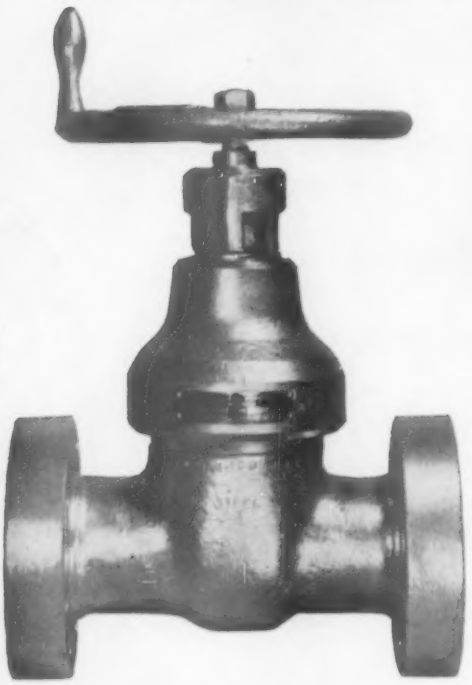


BIW Non-Lubricated GATE VALVES

CUT VALVE MAINTENANCE COSTS

A BIW Non-Lubricated Gate Valve is money in your pocket every time you use it. Money that is saved on day to day maintenance. For the BIW Valve requires **no lubrication** to make a seal and **no lubrication** to hold a tight seal. The BIW Non-Lubricated Gate Valve makes **economy** a fact.

But as important as economy is the complete dependability of the BIW Non-Lubricated Gate Valve. It is always ready and easy to open or close. Once in you can forget it. The simplified design of the complete line of BIW valves insures years of operation without trouble.



The design of the BIW Non-Lubricated Gate Valve has been proved by more than 35,000 field installations. The metal to metal seal, simplified design, low opening torque required, and the many other BIW features are now available in the complete line of BIW valves, up to 15,000 lbs. test pressure! See the BIW engineer today and forget about the problem of lubricating valves.

ALCO

American Locomotive Company

Beaumont Plant—Formerly Beaumont Iron Works Company

Oil Tool Sales Office—1404 Dunlavy—Houston 19, Texas

Oil Tool Warehouses in Beaumont and Odessa

MS

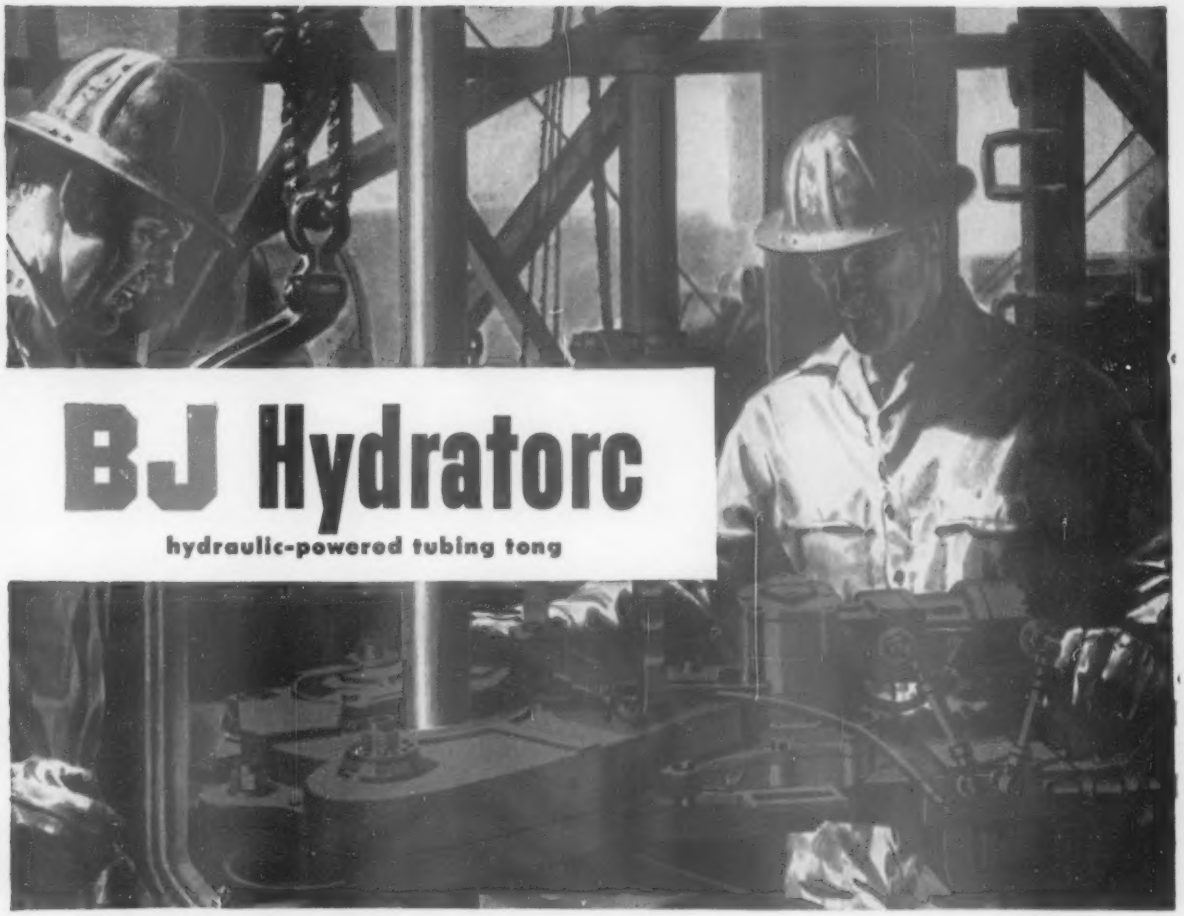
FACTS on Westinghouse 5000-hp gas turbines . . .

Delivers gas with less horsepower

Gas-turbine-driven centrifugal compressors give high efficiency at high-flow, low-compression ratio. • Stations can be spaced closer together, maintaining a high average pressure with less horsepower. • Any one centrifugal compressor can handle the full flow, so fewer units are required for a given length of pipelines. • Gas turbines are high-speed prime movers—no reduction gears required to drive centrifugals efficiently.

For more information, see your Westinghouse sales engineer, THE MAN WITH THE FACTS, or write for booklet B-5859, Westinghouse Electric Corporation, 3 Gateway Center, Pittsburgh 30, Pa. J-50578

YOU CAN BE SURE... IF IT'S Westinghouse



BJ Hydratorc

hydraulic-powered tubing tong

More torque, more horsepower, more speed for tubing, workover and slim hole drilling

Byron Jackson — the pacemaker in power tools — puts *more* power to work for you in the new BJ Hydratorc Tubing Tong.

GREATER TORQUE: Provides up to 1650 ft-lbs. of torque in high speed and up to 6300 ft-lbs. in low speed. Maintains more constant torque over entire speed range.

MORE HORSEPOWER: Able to deliver 12 HP *continuously* if required. Operates at 75 to 100 RPM in high speed.

HEAVY DUTY TRANSMISSION: This "beefed-up" transmission is built to handle the extra horsepower and greater torque output of Hydratorc's hydraulic motor... without overloading or strain.

CHOICE OF POWER SOURCE: The BJ Hydratorc can usually be operated off the regular hydraulic system provided to raise mast-type rigs... or can be supplied with auxiliary trailer-mounted hydraulic power source if desired.

WIDE WORK RANGE: Quickly interchangeable jaws and bushings handle all standard tubing sizes as well as special tool joints and couplings. Special clamp allows sucker rod stripping work.

Ask your nearby BJ Sales Office for details or write:

Right for rubber, too!

Say "BJ" for all your oil field rubber product needs... drill pipe, tubing and sucker rod protectors, pipe wipers and wire line guides.

BJ

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Oil Tool Division *Since 1872*

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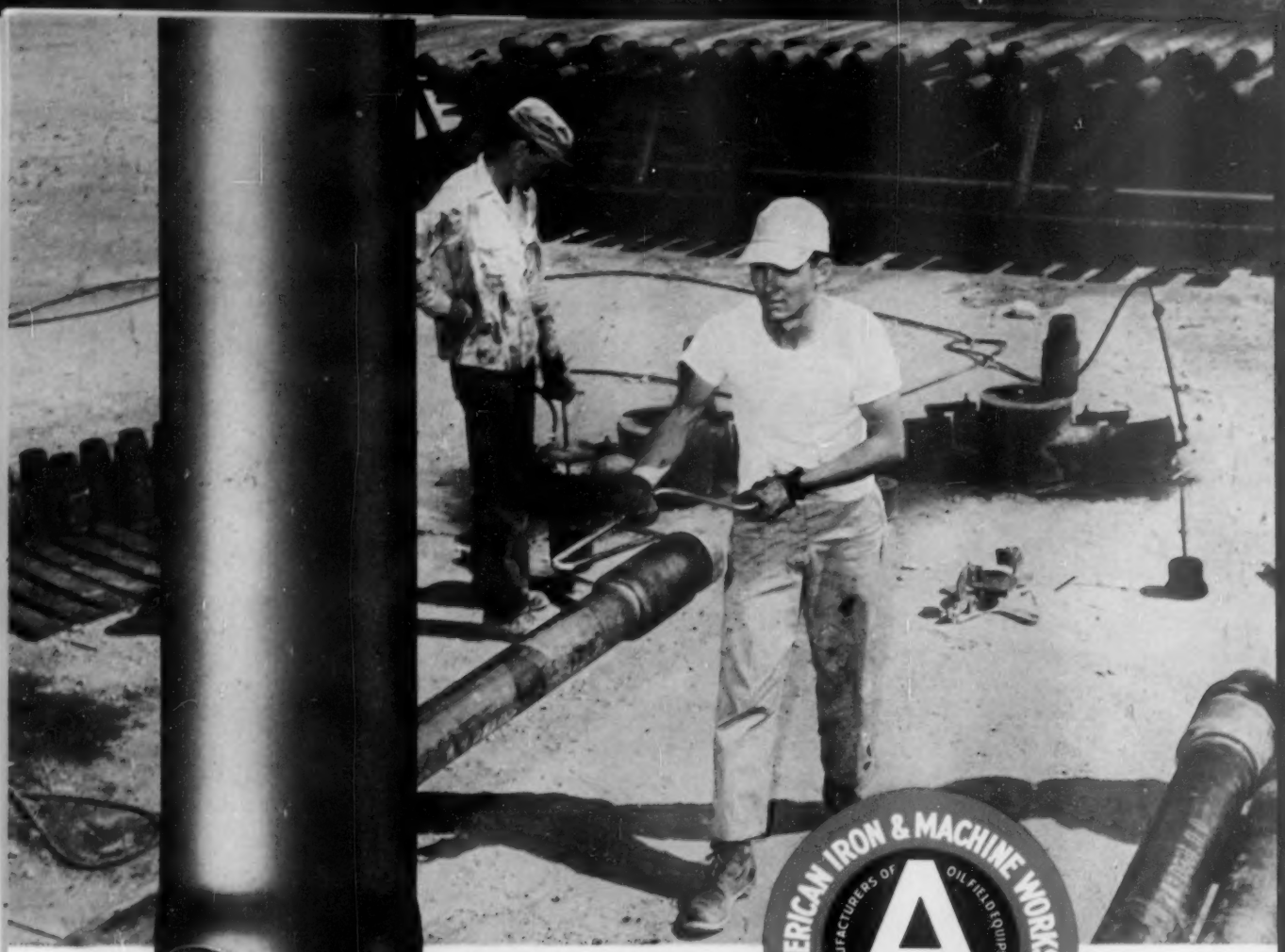
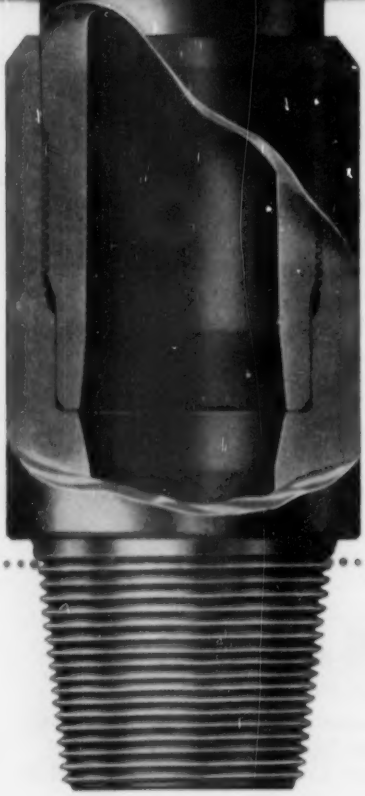
Offices in Houston, Fort Worth, Denver and New York and Sales Engineers in all principal oil fields





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MANUFACTURERS OF OIL FIELD EQUIPMENT
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Installed any place . . . any time! All necessary equipment for installation and removal of hand-applied Straight Grip tool joints is brought to your rig or yard . . . saving you trucking expense and valuable down time.

You save many ways when you invest in

AMERICAN IRON

Straight Grip

TOOL JOINTS

● Four points of seal! ● Three times as strong as the pipe they connect! ● The higher the tension load and pump pressure . . . the tighter the seal!

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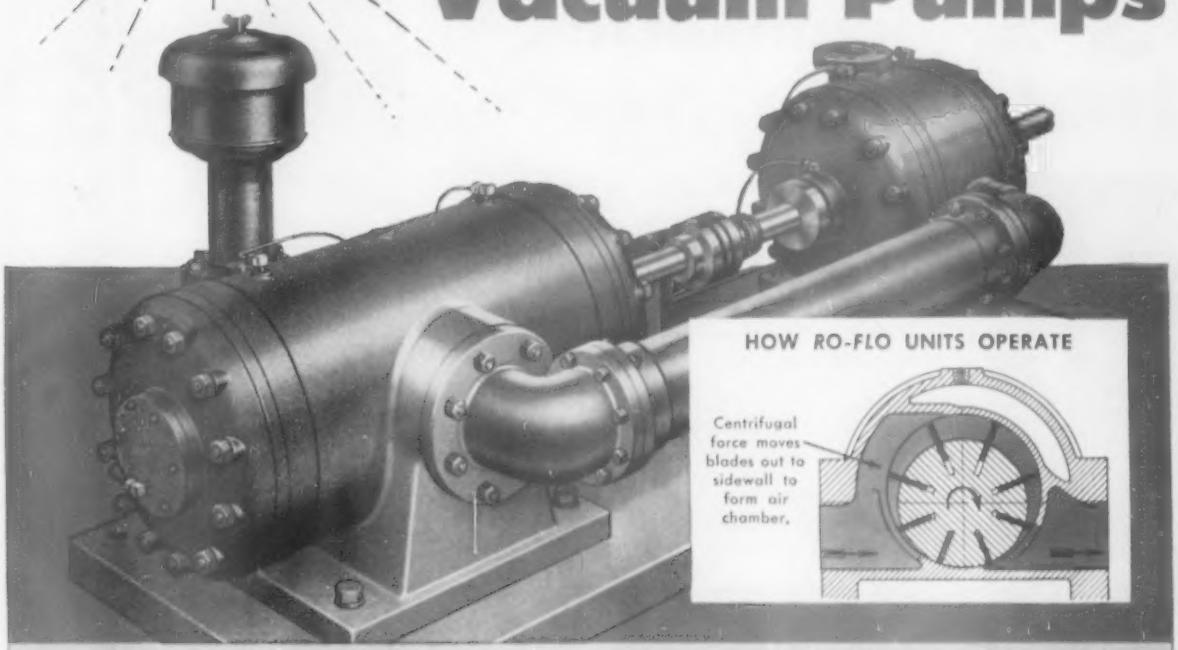
0.3-in. Mercury Absolute Vacuum Pumps



FOR SHOP AIR • DRILLING • GAS HANDLING • VACUUM PUMPING

Now—the *Ro-Flo* line is extended to include high pressure as well as low pressure units to give you three important advantages:

Constant efficiency — Automatic compensation for wear is inherent in *Ro-Flo* design. During operation, rotor blades slide against the sidewall to form air cells. Any blade wear from this action is compensated for by the rotating force which holds blades in contact with the cylinder.

Simple foundation requirements — The smooth rotation of the *Ro-Flo* unit cuts vibration and eliminates need for heavy, expensive foundations.

Low maintenance — Shock and vibration, inherent in reciprocating machines, is eliminated. This cuts maintenance.

Two-stage *Ro-Flo* compressors can be furnished in any of 12 sizes to handle from approximately 250 to 1800 cfm at pressures from 65 to 125 pounds gauge. Vacuum pumps furnished from 200 to 5040 cfm at 29.7 inches Hg vacuum, with shut-off of 29.9 inches Hg, referred, or better. Single-stage units are built for pressures up to 50 pounds gauge, 65 pounds absolute. Single-stage pumps for vacuums up to 28 inches Hg referred.

A-4569

GET INFORMATION

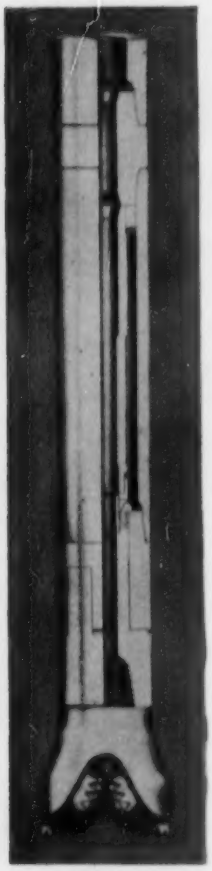
Call your nearby A-C district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Ro-Flo is an Allis-Chalmers trademark.

ALLIS-CHALMERS

announcing the

NEW JOHNSTON HYDRAULIC hole caliper



Receiving sub in drilling position — positioned between drill collar and bit. Caliper instrument is dropped or pumped down just prior to pulling out of hole.

Gives you a NEW HIGH in accurate caliper logging — with a NEW LOW in rig time

This latest development of Johnston Testers, Inc., gives continuous measurement and recording of hole diameter, and eliminates drilling-rig down time.

Saves rig time because it eliminates time lost in rigging up and running wire line caliper.

The instrument is dropped into the drill pipe just before removing pipe. It measures and records as drill pipe is removed from the hole.

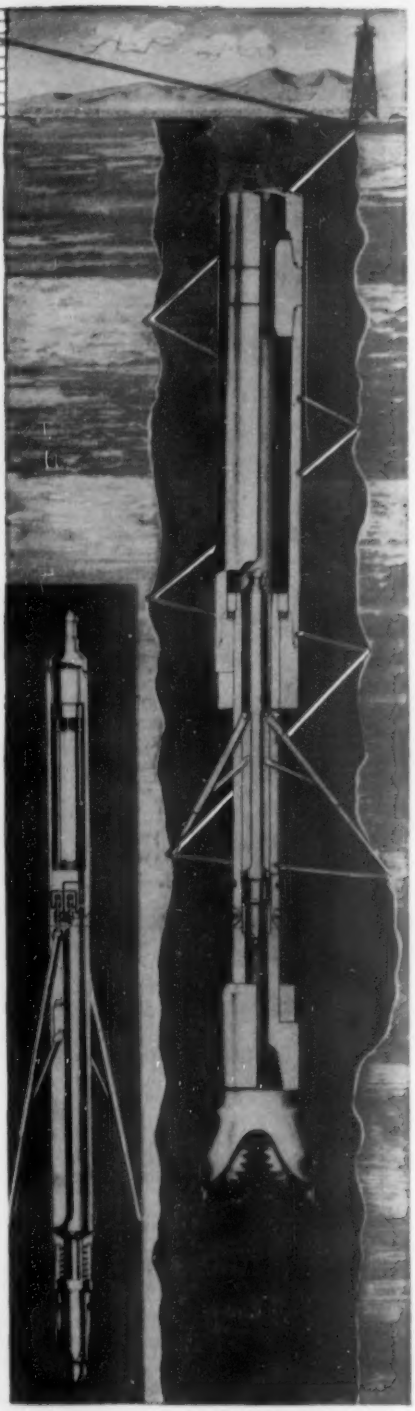
Logs while drill pipe is in the hole, free to circulate at any point. No delay or difficulty in crooked or directionally drilled holes.

Accuracy is assured because the Caliper is completely hydraulic, with integrated measuring arms that constantly measure maximum hole diameter, whether the Caliper is centralized in the hole or not.

Two-speed recording gives either a detail or a normal chart.

Let us give you all the facts about the new Johnston Hydraulic Hole Caliper and its many uses where extremely accurate measurement and recording of subsurface conditions are required.

WRITE OR CALL FOR FREE FOLDER



This is the Caliper instrument with cutaway view of the hydraulic system, clock and chart compartment.

Receiving sub is open and Caliper in measuring position. Caliper instrument unlocks sub as it is indexed in place.

JOHNSTON TESTERS

first in drill stem testing

HOUSTON, TEXAS

LOS ANGELES, CALIF • CALGARY, CAN.

FORMATION AND CASING TESTING — JOHNSTON

HC 541

New...

for machine designers and users...

J-M brings you a

COMPLETE OIL SEAL REFERENCE MANUAL

Here, in one handy book, is everything you need to know about America's leading oil seals. In 28 pages, fully illustrated, J-M tells you how you can improve performance and cut costs with more effective sealing, longer lasting Clipper Seals.

There are detailed descriptions of all the latest standard seal designs including the new LPD and RPD . . . as well as those for special applications. Uses in petroleum, automotive, mining, earth-moving, aviation, iron and steel, machine tool and process industries are covered thoroughly.

Documented case histories tell how leading manufacturers have profited from the superior performance of Clipper Seals. Full use is made of every type of illustration for complete descriptions of important applications. Close-up photographs show how to install split Clipper Seals in limited space.

Learn how Clipper Seals' many advantages can cut costs for you . . . by simplifying design problems, speeding assembly and providing improved lubricant retention and dirt exclusion under all conditions. Write for free brochure PK-71A to Johns-Manville, Box 60, New York 16, N. Y. In Canada, Port Credit, Ont.

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Please send me free copy of new Clipper Oil Seal Brochure (PK-71A)

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HERE'S WHY PENBERTHY GAGE VALVES ARE YOUR BEST BUY!

Long, Trouble-Free Service Built-In

Penberthy Type 300 Standard Liquid Level Gage Valve
"Du-Lux" Black Enamel Finish

- **A** Steel Locknut
- **B** Identification Plate
- **C** Steel Wheel or Lever
- **D** Steel Stem Packing Nut
- **E** Stainless Steel Standard or Quick-Closing Stem
- **F** Stainless Steel Packing Gland
- **G** High Temperature Resisting Stem Packing
- **H** Stainless Steel Stem Packing Retainer
- **I** Forged Steel Body
- **J** Stainless Steel Ball
- **K** Stainless Steel Ball Retainer
- **L** Patented "Floating Shank"
- **M** Steel Tailpipe
- **N** Steel Coupling Nut

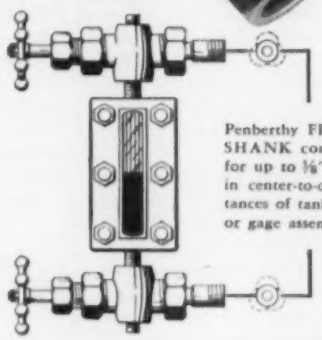
UNION GAGE CONNECTION models permit removal of gage without disturbing valves or draining system.

Plus..*at no extra cost*..Exclusive FLOATING SHANK

No other gage valve has all of the quality features of a Penberthy. Features that add up to top performance at lowest cost. You can see that for yourself in the "exploded" view of a Penberthy valve.

In addition, the FLOATING SHANK is a time and labor saving feature that cuts installation and replacement costs by 50% or more. It also eliminates strain, caused by a forced installation, with its subsequent danger to the entire installation.

Try Penberthy Gage Valves on your next installation. See for yourself why they are your best buy. Obtain them through your local supplier or direct. WRITE for Catalog No. 35 showing the complete line . . .



Penberthy FLOATING SHANK compensates for up to ⅛" variation in center-to-center distances of tank tappings or gage assembly.

PENBERTHY INJECTOR COMPANY

Division of the Buffalo-Eclipse Corporation

1242 Holden Avenue, Detroit 2, Michigan

***There's Certain Satisfaction in* PRODUCTS BY PENBERTHY**

- GAGES
- EJECTORS
- EDUCTORS
- EXHAUSTERS
- SYPHONS
- ELECTRIC SUMP PUMPS
- CYCLING JET PUMPS
- INJECTORS

they never get tired!
• YARWAY Single-end Welding-type Gun-Pakt joint for 150 lbs. pressure.
• Some of the 189 YARWAY Gun-Pakt expansion joints installed at large oil refinery in Texas.

No fatigue with 189 YARWAY GUN-PAKT EXPANSION JOINTS at this large Texas refinery

THEY just work and work for years and never get tired. Yarway Gun-Pakt slip-type joints simply will not fail through fatigue. They will operate smoothly, as frequently as required, over long, full traverse up to 12″ single type or 24″ double type or short, partial traverse, day in and day out—with never any danger of metal fatigue or failure.

This is just one of the many big advantages found in Yarway Gun-Pakt expansion joints. Other outstanding Gun-Pakt features are:

1. Can be serviced under *full* steam pressure day and night, thus avoiding costly and inconvenient shutdowns.
2. Fixed Gun-Pakt gland serves as "built in" external guide and permits less costly and rigid pipe guidance than required by many other types of joints.
3. Lower pressure load on end anchors because excessive strains are eliminated.

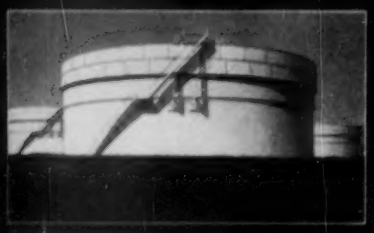
Used for many years with success in well-known refineries, industrial plants, utilities and institutions. When replacing present joints or planning new steam lines, it will pay you to look into the advantages of the Yarway Gun-Pakt expansion joint. Write for Yarway Bulletin EJ-1913.

YARNALL-WARING COMPANY
136 Mermaid Avenue, Phila. 18, Pa.
BRANCH OFFICES IN PRINCIPAL CITIES

YARWAY

gun-pakt expansion joints

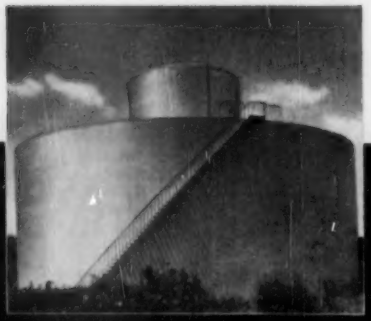
GRAVERSPHERES are used to store natural gasolines and volatile liquids including butane, butadiene, etc. They are ideal for storing gases—sustaining pressures up to 100 psi. and greater. Capacities range from 500 to 20,000 bbl.



GRAVER EXPANSION ROOF TANK eliminates breathing losses and minimizes filling losses. Its positive liquid seal, exclusive with Graver, protects under all conditions. Ideal for converting existing tankage, and simple to maintain, the Expansion Roof Tank may well protect an entire terminal.

there is a GRAVER *CONSERVATION DESIGN to fit every need!*

Graver manufactures a number of conservation designs allowing you to specify what suits your exact needs. Thus your tankage can be "tailor-made" to obtain optimum efficiency and maximum economy in operation. For authoritative assistance with your conservation problems, consult your nearest Graver Sales Engineer.



GRAVER VAPOR-MIZER is an economical design that conserves vapors, using less steel in building and requiring smaller vapor lines in manifolded tankage. The VAPOR-MIZER helps maintain the fresh quality of your product! As it operates at very low pressures, the reinforcement of manifolded tanks becomes unnecessary.

GRAVER DOUBLE-DECK AND CENTER-WEIGHTED FLOATING ROOF TANKS are two separate designs in which the roof floats directly on the liquid, preventing the formation of vapors. They are applicable to crude and product storage areas at refineries, terminals and large bulk installations.

GRAVER

tank fabricators for 97 years

GRAVER TANK & MFG. CO., INC.

East Chicago, Indiana

NEW YORK • CHICAGO • PHILADELPHIA • ATLANTA • DETROIT • CLEVELAND
PITTSBURGH • HOUSTON • CATASAUQUA, PA. • SAND SPRINGS, OKLA.
CASPER, WYO. • ODESSA, TEXAS • LOS ANGELES • EDGE MOOR, DEL.
TULSA • SAN FRANCISCO • FONTANA, CALIF.

Cut Rig-Up Time

WITH

AEROQUIP FLEXIBLE HOSE LINES and SELF-SEALING COUPLINGS

The ease with which fluid-carrying lines can be installed, connected and disconnected makes the big difference in rig-up time and tear-down time. You can save time on these operations with two Aeroquip products:

FLEXIBLE HOSE LINES eliminate alignment problems, install in a fraction of the time required to fit rigid piping. Aeroquip hose lines can be made right in the field because fittings are detachable and reusable.

SELF-SEALING COUPLINGS provide quick connection and disconnection of fluid-carrying lines even when they are under pressure. No fluid gets out . . . no air gets in.

Get these time-saving Aeroquip products at your supply store, or write us for information.

This fuel storage tank, owned by Union Rotary Corporation, of Mt. Pleasant, Mich., is equipped with three self-sealing couplings and Aeroquip hose lines. The tank can be removed without draining the tank or fuel lines.

Aeroquip

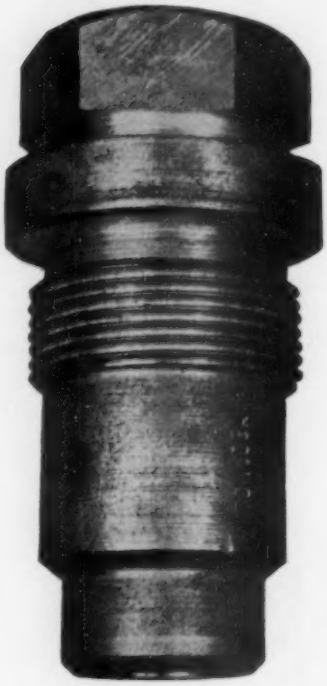
REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

This stem seat of plain carbon steel, removed from an Adjustable Wing Valve after only 45 days of service on a gas-condensate well, graphically illustrates the seriousness of corrosion.

After 7 years of continuous service on the same well, this stem seat of UNIBOLT "SA" Stainless Steel shows little, if any, harmful effect of the gas-condensate corrosion.



If CORROSION is your problem

UNIBOLT "SA" Stainless Steel Christmas Tree Fittings may provide the answer. For the past seven years, in cooperation with a major oil company, UNIBOLT engineers have experimented with various stainless alloys to determine the one most resistant to gas-condensate corrosion. The un-retouched photographs above of identical parts tested on the same well clearly indicate the wisdom of selecting UNIBOLT "SA" Stainless Steel Fittings for corrosive conditions.

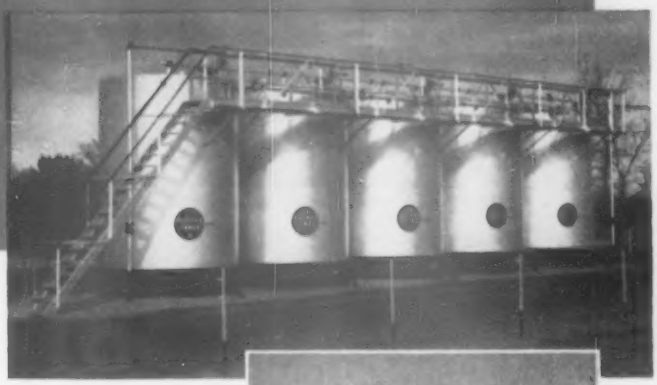
UNIBOLT "SA" STAINLESS*

THORNHILL CRAVER CO.

P. O. BOX 1184 HOUSTON, TEXAS

* Special Analysis, Special Heat-treatment

There's a DIFFERENCE
IN WELDED TANKS, TOO!



MALONEY-CRAWFORD
WELDED STEEL TANKS ARE:

- Constructed in Accordance with API Standard 12-F (some on the market are not)
- Made with NEW STEEL (some on the market are made out of used steel)
- Constructed in Accordance with BEST WELDING Practice — automatically welded (see weld detail below)

Maloney-Crawford Welded Steel Tanks owned by Major Oil Companies. Automatic welded, they have flanged decks and bottoms. Available with cone or flat bottoms or with aluminum deck for sour crude.

PLUS...

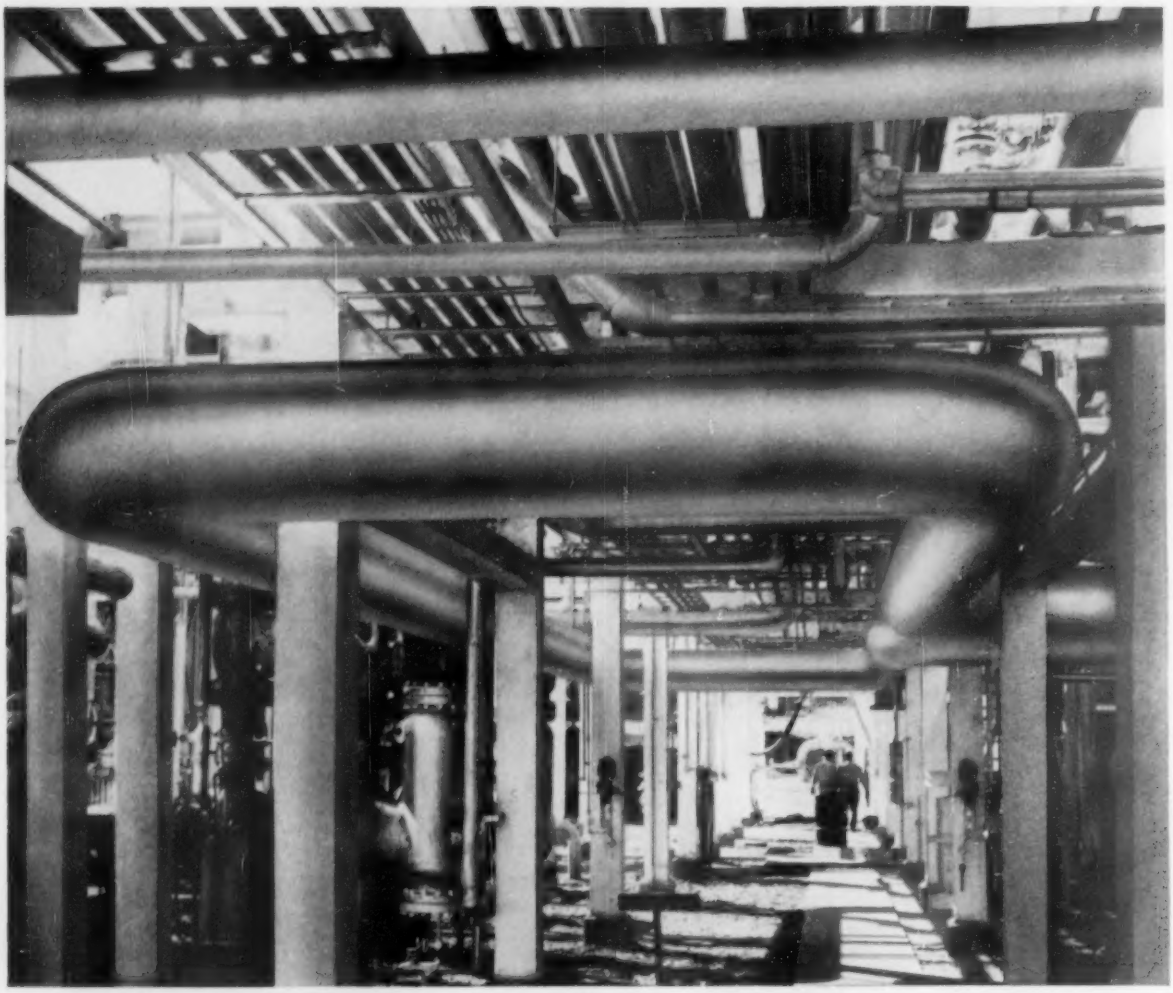
M-C welded steel tanks are welded by the shield arc process (under rigid supervision) and hydrostatic tested to insure against leaks.

- Trained Crews available in Mid-Continent Area for setting, aligning and building walkways.
- Be sure you are getting the best with a M-C Welded steel tank.

MALONEY-CRAWFORD TANK AND MANUFACTURING CO.

FACTORY AND GENERAL OFFICE, 38 North Peoria—Box 659—Tulsa, Oklahoma
EXPORT REPRESENTATIVE: Baird Lines—420 Lexington Avenue—New York, N. Y.
CANADIAN REPRESENTATIVE: Maloney-Crawford Tank & Service Company, Ltd.—Edmonton.
TEXAS PANHANDLE REPRESENTATIVE: Atlas Tank Company—Pampa, Texas.

MALONEY-CRAWFORD TANK & MFG. CO.



Less heat loss at joints with single-layer Unibestos® Pipe Insulation

Tests prove that Unibestos single-layer pipe insulation actually provides greater protection than other nonfibrous *double-layer* insulations which cost more to install. Unibestos is made of Amosite—the long-fibered African asbestos. These fibers interlock with one another to prevent heat loss at horizontal and longitudinal joints.

While most insulating materials show a pronounced shrinkage at high temperatures, Unibestos has no measurable shrinkage at 1200°F. It will not powder, pulp or wash off, even under heavy moisture conditions, and when dry, Unibestos resumes its original thermal and physical characteristics.

EASY to install . . . easy to remove.

Unibestos can be cut, mitered and handled easily. The fabrication of insulation for tees, valves, flange covers, etc., is a fast, low-cost operation. Because of its unusual strength and durability Unibestos can be removed and replaced with little or no loss of material.

STANDARD PRODUCTION SIZES

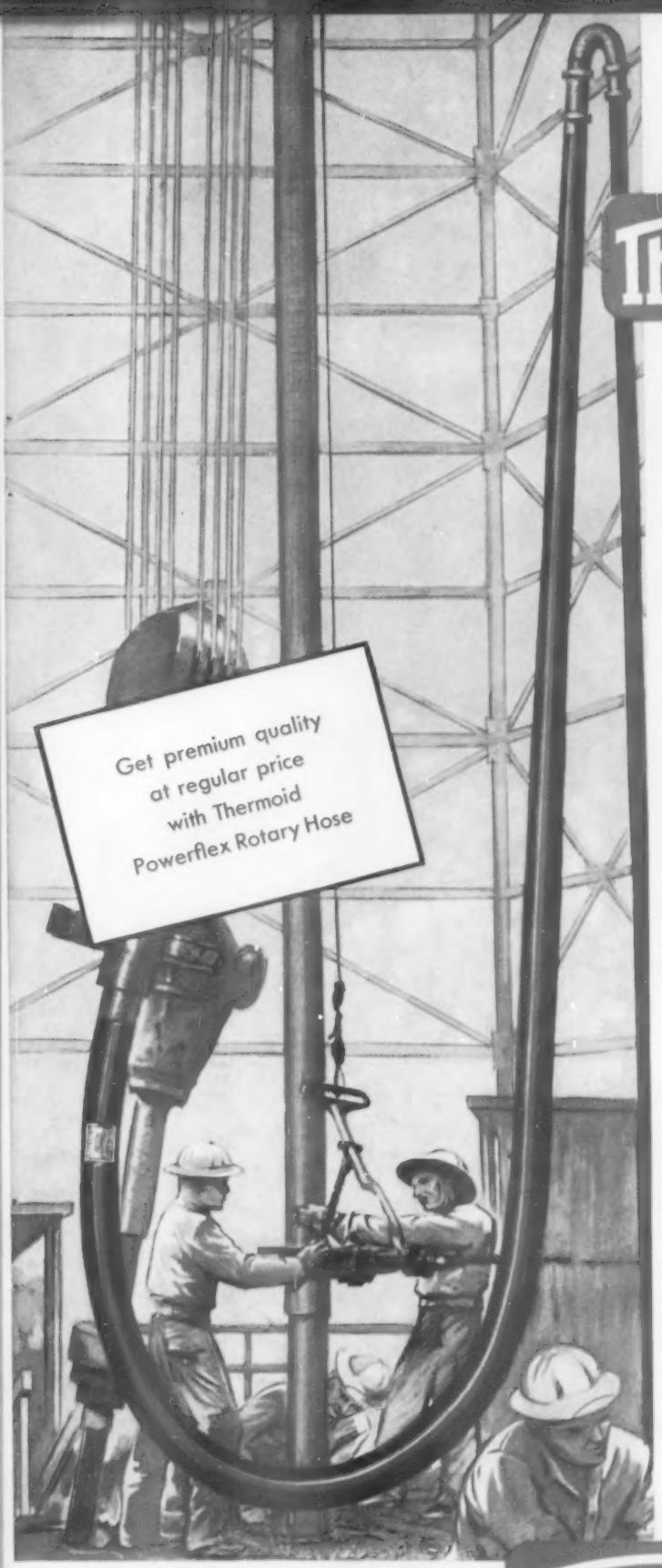
Unibestos Pipe Insulation is regularly made in 3-foot lengths for pipe sizes from ½″ through 24″, in standard thicknesses through 5″. Unibestos Block Insulation is made in 6″, 12″, 18″ or 36″ widths and in thicknesses from 1″ through 3″ in ½″ increments.

For complete information, write for descriptive Bulletin 109C

UNARCO

UNION ASBESTOS & RUBBER COMPANY

1111 West Perry Street • Bloomington, Illinois



Thermoid

POWERFLEX Rotary Hose

. . . the most widely imitated Hose in the oil field!

None have been able to fully match the strength and flexibility of Thermoid Powerflex Rotary Hose.

Powerflex is made of oil-and-abrasion-resistant synthetic rubber, reinforced with impregnated multi-ply woven fabric and high tensile steel cable. Its tough, extra-heavy cover resists weather and abrasion. The materials used in Powerflex are available to any hose manufacturer. But it's the way Thermoid wraps and couples Powerflex Hose that prevents duplication.

Patented full-flow couplings are an integral part of each cable, permanently secured before the hose is wrapped. They are guaranteed and leak-proof . . . positively cannot blow off. Every length is pre-tested to 5,000 psi . . . exceeds all API requirements.

For heavy duty service, always demand Thermoid Powerflex Rotary Hose . . . available in all standard sizes and lengths. Order Powerflex and other Thermoid Oil Field Products listed below, from your nearest supply store or from one of the Thermoid warehouses listed in:

Houston, Texas
Oklahoma City, Okla.
Nephi, Utah
Casper, Wyoming
Los Angeles, Cal.

Thermoid

Powerflex Rotary Hose • Trioflex Slim-Hole Rotary Hose • Mud-Flo Slush Pump Hose • Flexible Discharge Units • F.H.P. and Multiple V-Belts • Oil Country Flat Belting

Wire Line Turn Backs • No-Wip Line Savers • Stuffing Box Rings • All Types of Hose • Molded Specialties • Brake Blocks

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

now even better

SKF Triple-Seal "SAF" PILLOW BLOCKS

BETTER Because SKF's Type "C" Spherical Roller Bearings . . .

increase capacity 25% to 50%

increase service life 2 to 3½ times

Designers throughout industry have heard the news from SKF — news about the SKF Type "C" Spherical Roller Bearing which, size for size, gives up to 50% increased capacity, 2 to 3½ times longer life!

Now there's more SKF news:

You can now get the famous SKF Triple-Seal "SAF" Pillow Block *equipped with the Type "C" Spherical Roller Bearing!*

This *in addition* to effective sealing from dirt.

This *in addition* to lubricant retention.

This *in addition* to adapter mounting for tight fits on standard shafting; "Free" or "Held" design.

This *in addition* to easy installation and inspection.

This *in addition* to bearings that self-align.

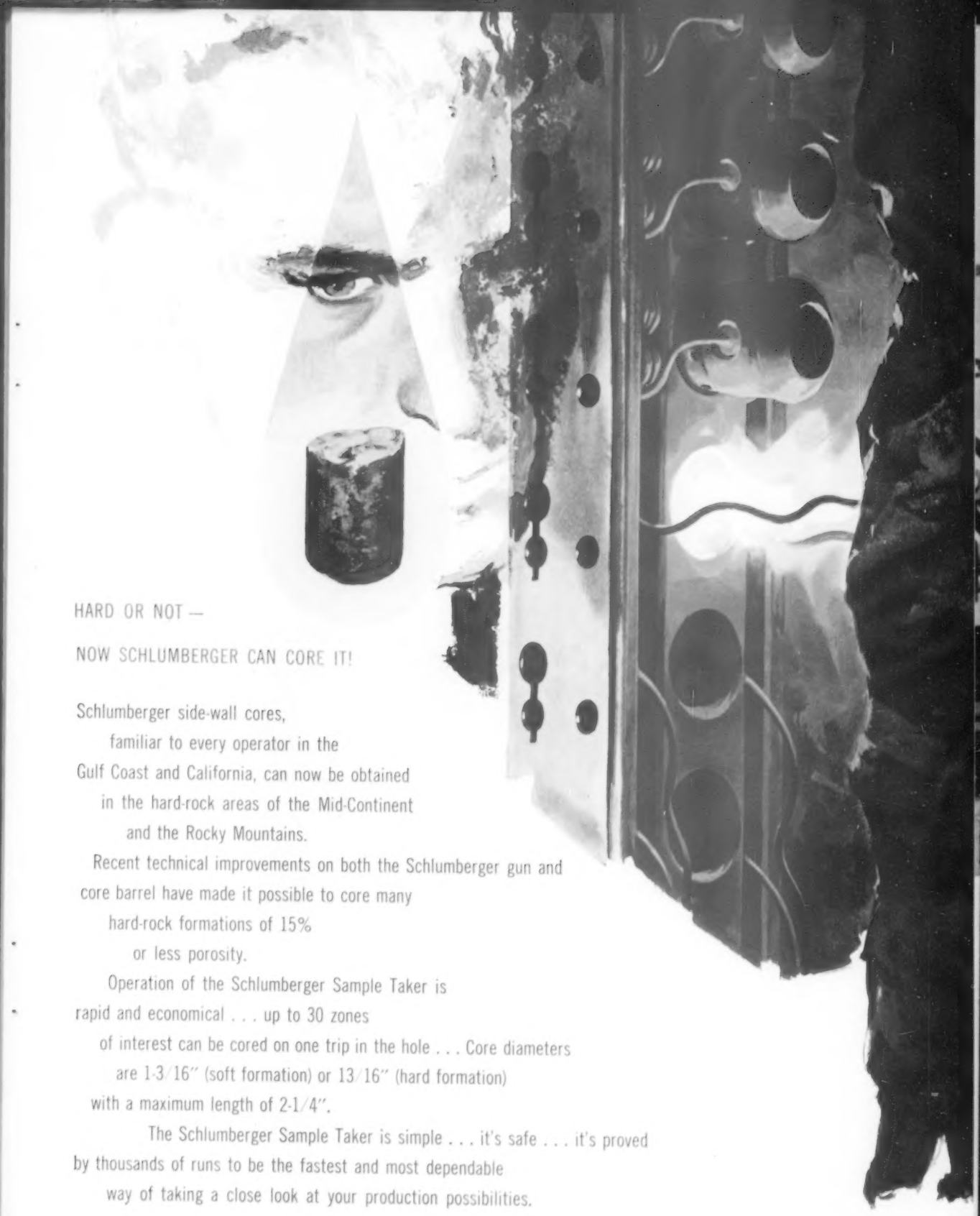
This *in addition* to greatly *increased bearing capacity and life.*

No other available bearing design gives you the capacity and life of the SKF Type "C" Spherical. Plan on it as part of your design, wherever you need a heavy-duty Pillow Block.

Any SKF District Office will help you. **SKF INDUSTRIES, INC.,** PHILADELPHIA 32, PA. — *manufacturers of* **SKF** *and* HESS-BRIGHT *bearings.* 7512

Send for SKF Bulletin No. 365-A — which gives complete facts — sizes available — increased life you can expect for each size.

SKF®
BEARINGS AND PILLOW BLOCKS



HARD OR NOT —

NOW SCHLUMBERGER CAN CORE IT!

Schlumberger side-wall cores,
familiar to every operator in the
Gulf Coast and California, can now be obtained
in the hard-rock areas of the Mid-Continent
and the Rocky Mountains.

Recent technical improvements on both the Schlumberger gun and
core barrel have made it possible to core many
hard-rock formations of 15%
or less porosity.

Operation of the Schlumberger Sample Taker is
rapid and economical . . . up to 30 zones
of interest can be cored on one trip in the hole . . . Core diameters
are 1-3/16" (soft formation) or 13/16" (hard formation)
with a maximum length of 2-1/4".

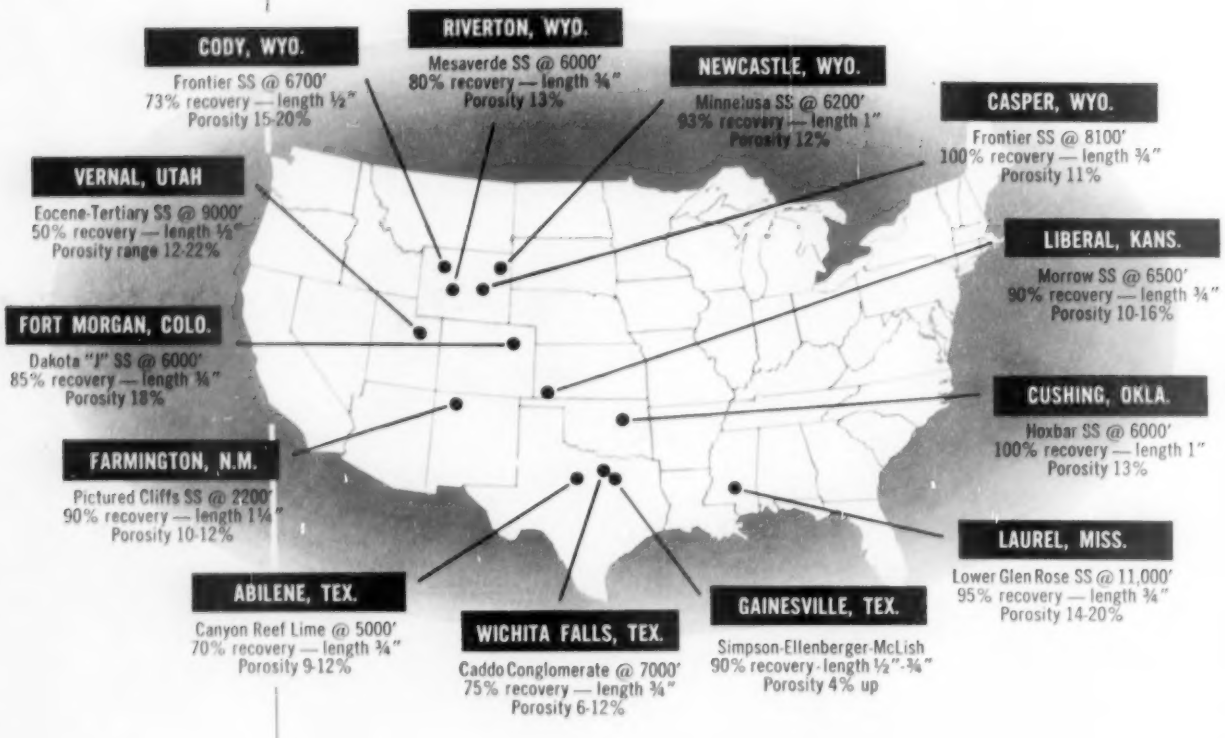
The Schlumberger Sample Taker is simple . . . it's safe . . . it's proved
by thousands of runs to be the fastest and most dependable
way of taking a close look at your production possibilities.

THE EYES OF THE OIL INDUSTRY **SCHLUMBERGER**

Well Surveying Corporation

LOOK AT THESE RESULTS

with the NEW SCHLUMBERGER SAMPLE TAKER IN HARD ROCK AREAS



SIMPLE • SAFE • FAST • DEPENDABLE CORING

THE EYES OF THE OIL INDUSTRY

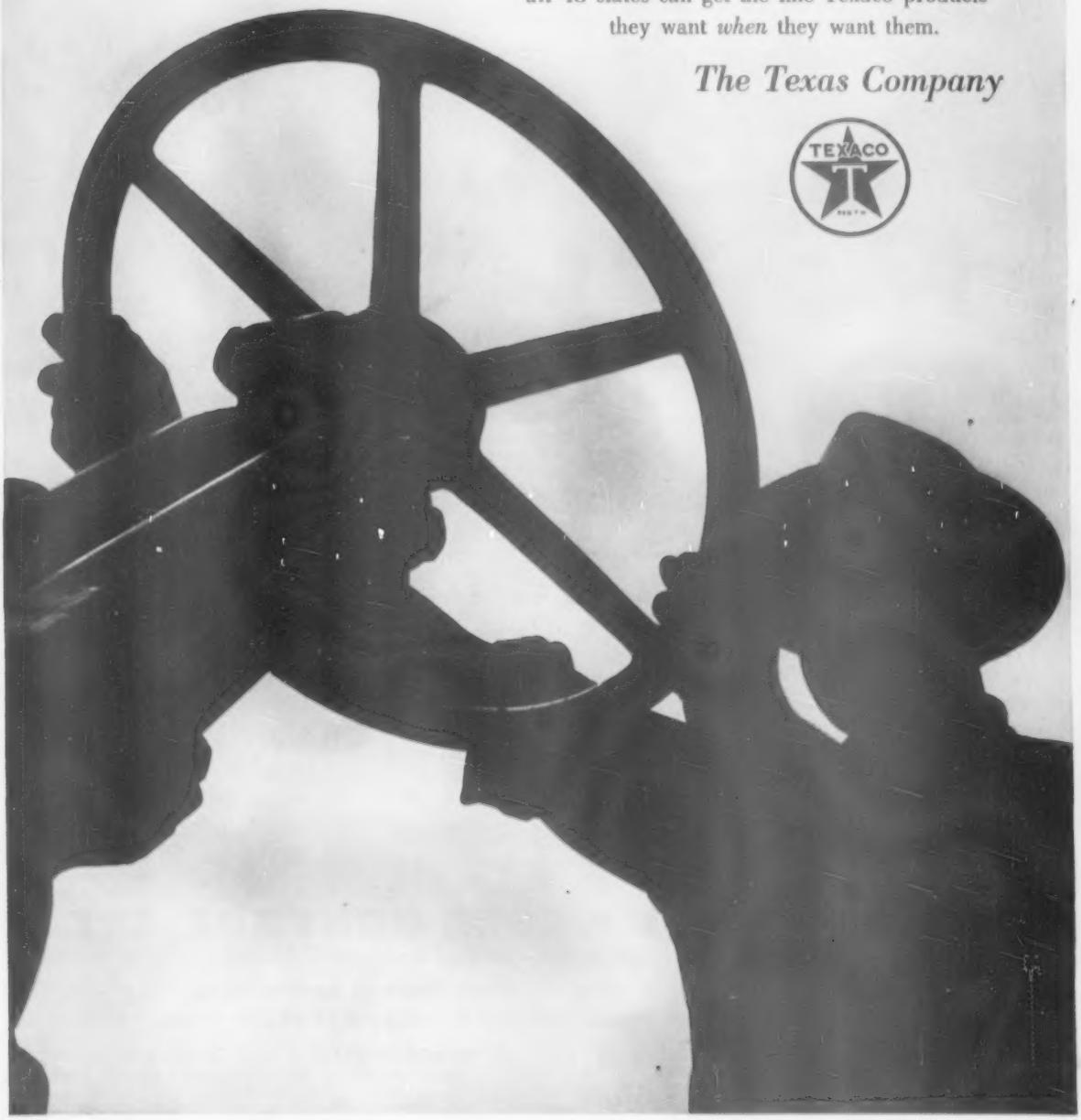
SCHLUMBERGER

BIG WHEEL

Oil is a moving, journeying thing.
Before it ever gets to the consumer, it has to travel through a maze of pipes that criss-cross this country. And on the way, it must make a lot of stops to go through a lot of processes. At all these points where oil comes in and goes out, you've got to have valves to control its flow. Here's one of the men who turns and tends them. He's a "big wheel" in a big job — he is oil's Chief Stationmaster. He can start it . . . stop it . . . switch it . . . route it in any way. His skill is one of the big reasons why people in all 48 states can get the fine Texaco products they want *when* they want them.

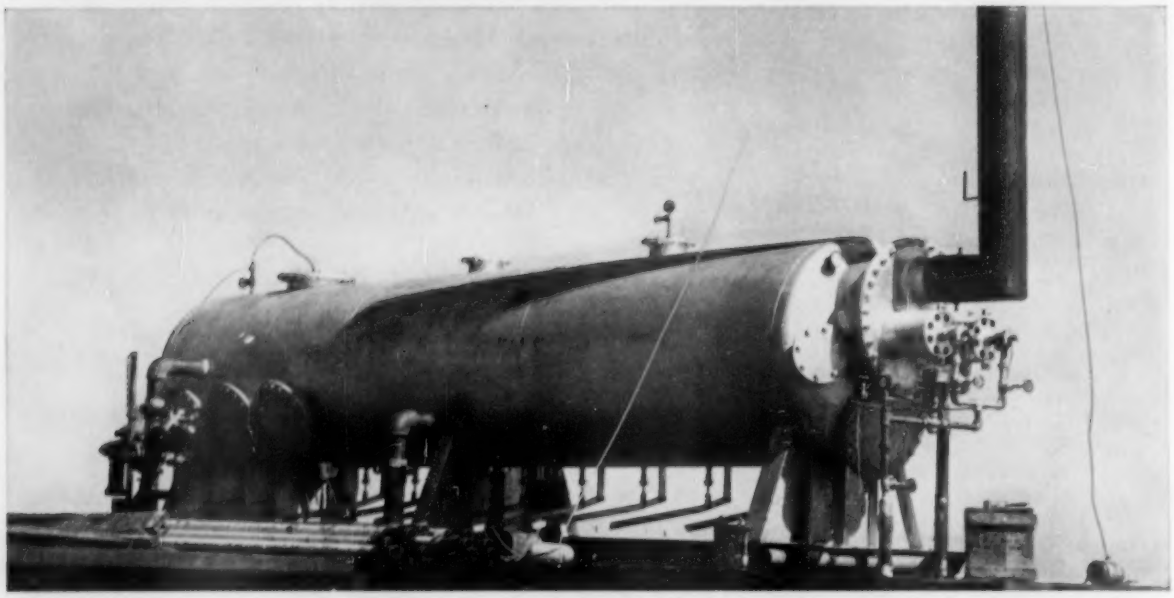
The Texas Company

TEXACO



ANNOUNCING

ERWIN EMULSION TREATERS



4' x 20' Erwin Emulsion Treater in little Lake Field, South Louisiana. Note the exclusive two-burner, "Tri-tube" firebox; convenient location of pipe connections; and the size and location of manways. Handles extending from underside of treater are part of the unique and positive method of eliminating sand and sediments without disturbing treater operation.

New horizontal emulsion treaters offer high capacity, high efficiency and low treating costs

The Erwin Emulsion Treaters, now offered by Salt Water Control, Inc., are the result of fifteen years continuous development and improvement. Over 100 installations in New Mexico, Texas and Louisiana have proved their ability to handle a variety of treating problems economically and efficiently.

Erwin Emulsion Treaters offer several exclusive features that eliminate some treating "evils" formerly accepted as "necessary". These features, along with various improvements in basic design, provide greater efficiency, higher treater capacity, less maintenance cost, and greatly reduced down-time.

If you want the maximum value for your treater dollar, values measured in years of continuous utility, get the detailed facts on this new product before you buy another treater. Write us or call one of the Salt Water Control representatives listed below.

SWACO

SALT WATER CONTROL, INC.

(A SID RICHARDSON DEVELOPMENT COMPANY)

1211 Ft. Worth National Bank Building

Phones: FA-4434 — SU-8292 Ft. Worth, Texas

BRANCH PHONES

Corpus Christi	Houston	Lafayette, La.	New Orleans	Kermit, Texas
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At last

a valve-in-head,
air-cooled engine that delivers

FULL POWER

rated at 30 h.p.! delivers 30 h.p.!

Lycoming's new C2-90

for construction field
oil and gas industry
agricultural service
general industrial use

44 years of engine-building experience for aviation, automotive and marine fields stand behind Lycoming's new C2-90. Over $1,000,000 and 5 years of time have gone into its development.

New Lycoming FULL

Now... an amazing new 30-h.p. engine

Lycoming C2-90
2-cylinder 30 h.p.

Lycoming—44 years a leading designer and producer of engines—now presents a new, advanced design industrial engine. In addition to traditional air-cooled advantages of lighter weight, lower cost, all-weather performance and superior endurance, this amazing 30-h.p. unit offers:

- FULL POWER performance—*rated* at 30 h.p.—*delivers* 30 h.p.!
- 1000 hr. continuous-duty life without overhaul.
- Highest horsepower and torque per cu. in. displacement in air-cooled field.
- Dependable operation under all weather conditions.
- Complete interchangeability—identical mounting and shaft dimensions with other major air-cooled industrial engine units in horsepower range.
- Reliability and simplicity for easy maintenance.

First of Lycoming's new family of 2- and 4-cylinder FULL POWER Air-Cooled Engines

THE

❶ At last... a valve-in-head design that delivers **FULL POWER**

❷ At last... positive pressure lubrication, rugged construction that mean **LESS DOWNTIME**

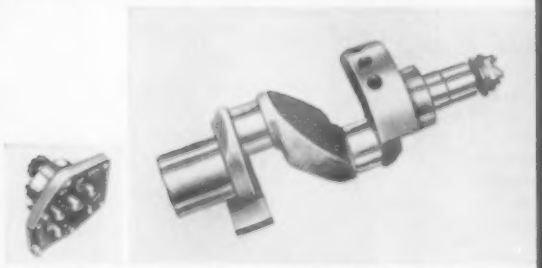
❸ At last... simplified design that assures **EASY INSTALLATION AND SERVICING**

POWER air-cooled engine

with these 3 unique advantages:

FACTS

Valve-in-head design and direct valve porting result in higher efficiency . . . greater horsepower . . . improved fuel economy . . . longer engine life.



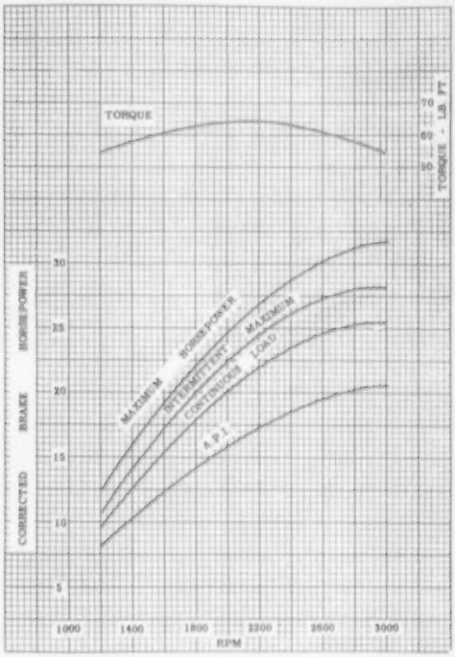
Oil pumped continuously under pressure to all moving parts. Result: less wear and overheating at friction points . . . longer, more trouble-free operation.

Crankshaft is extra-heavy and counterweighted. Drilled passages in crankshaft provide continuous pressure lubrication to bearings. Result: longer life.

- Readily accessible two-piece connecting rods are drop-forged, heat-treated steel . . . easy to install, remove.
- Precision-made automotive type bearings are easily replaceable . . . steel-backed . . . copper-lead lined. No cuts or grooves to break protective oil film.
- Engines have alloy valve seat inserts. Hard-faced positive type valves available—as well as hard-faced valve seats.
- Standard base allows complete interchangeability with other major air-cooled engines in its horsepower range.

THE FIGURES

compare Lycoming's FULL POWER Performance



* Find out how Lycoming's

FULL POWER C2-90

can be tailored to your needs at no extra charge!

Accessories mounted to your requirements:

1. Starter and generator
2. Battery ignition
3. Industrial clutches & reductions (Special crankshaft extensions available)

FOR FULL DETAILS WRITE TO:

DIRECTOR OF SALES ENGINEERING, INDUSTRIAL ENGINES
Lycoming Division, Avco Manufacturing Corporation, Williamsport, Pa.

FOR RESEARCH • FOR PRECISION PRODUCTION

LOOK TO **Lycoming**

DIVISION OF AVCO STRATFORD, CONN.
Manufacturing plants in Stratford, Conn., and Williamsport, Pa.

A member of Avco Defense and Industrial Products organization

DISTRIBUTOR INQUIRIES INVITED

Radio Dispatching Saves Trucks at Socony-Vacuum

RCA 2-Way Radio Makes Efficient "Automotive Pool" a Reality

(Above) Hydraulic lift raising pan to deck of loadlugger at Paulsboro, N.J. refinery of Socony-Vacuum Oil Company. *(Left)* Henry Cannavo, Assistant Foreman, Automotive, giving order via 2-way radio.

Pickup trucks, stake trucks, a fork lift, a jeep, a towmotor, winch truck and station wagon are radio-equipped for *instant control* by a dispatcher over a 33-mile radius at Socony-Vacuum Oil Company. These trucks are used for materials handling, maintenance, and labor transportation, one even going outside the plant to pick up materials. This has replaced the former method of assigning trucks to individual shops, causing idleness of some, at times, while others were overloaded. All are dispatched by RCA 2-Way Radio from a central control point.

"Two-way communication saves trucks," says Henry Cannavo, Assistant Automotive Foreman. "Take the case of our loadluggers, used to clear away pans of scrap filled by crews of laborers at strategic points throughout the yard. It used to be necessary to tie up dump trucks at these points. By substituting movable pans toted by radio-dispatched loadluggers, we estimate that five such vehicles are equal to 20 trucks."

In hundreds of installations, RCA 2-Way Radio is saving trucks—and money, by adding to the productivity of materials handling and maintenance vehicles, and reducing needless paper work and manhours. Are you making use of this profitable tool in your operation?

GET THE BEST—GET RCA 2-WAY RADIO . . . The high quality offered by the leader in radio and electronics gives assurance of top performance—under the most gruelling conditions. Simplest maintenance and operating requirements. The RCA Service Company makes available installation and service to keep your equipment operating at its peak.

MAIL COUPON FOR MORE INFORMATION

Radio Corporation of America, Communications Equipment, Dept. PD-89, Building 15-1, Camden, N.J.

☐ Please send new booklet, "How RCA Radio Control Cuts Cost of Materials Handling."
☐ Please have representative call on me.

NAME _____ TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

RCA ® **RADIO CORPORATION of AMERICA**
COMMUNICATIONS EQUIPMENT CAMDEN, N. J.

They Say—

Correction from Beirut

Dear Sir:

Please refer to your magazine dated December 27, 1954, page 125. We feel free to pay your attention to the fact that the capital of the so-called Israel is actually Tel Aviv and not Jerusalem.

This Holy City of Jerusalem has been recognized by the United Nations assembly as an international city . . .

S. S. Sibai
Electrical Engineer
Trans-Arabian Pipe Line
Beirut, Lebanon

Tampering With a Free Market

"The legislature does well to move with caution on a request to let the Texas Railroad Commission fix the price of natural gas as it comes out of the ground . . . Its passage is urged on the ground that price fixing at the wellhead is necessary to stop the economic waste of gas . . .

"Texas and other oil and gas producing states have run up an excellent record of conserving petroleum resources. They have done it through various measures, including the proration of oil production. The price paid for oil may have some influence in decisions affecting the amount of oil that may be produced. But it is not stipulated by law, and no responsible group has yet urged that Texas attempt to fix the price of oil at the wellhead. The best regulation of the price of gas is the producing field remains in the law of supply and demand. It is always risky to start tampering with a free market."

Editorial in the Dallas Morning News.

The Trans-Canada Fumble

"The healthy functioning of the so-called private enterprise economy depends on a regular supply of private enterprisers. They are people of energy, courage, and foresight who are willing to take on risks and problems today in the hope of profit tomorrow.

"The way of the private enterpriser at best is not easy.

"The failure of the Trans-Canada gas line project for this year is certainly no cause for private enterprise pride.

"Here is a great national utility that has been fumbled. Here is an obvious need that is not being met . . . By its

very nature its first years will be tough, but its longer term health is unquestionable. In fact whether there was ever any real need for asking the dominion government for any guarantee whatever is much open to doubt.

"There is no denying the infinite complexity of working out a final deal . . . But the conclusion is inescapable that it has suffered from apathy and pettiness of vision in quarters where it deserved a very different reception.

"The bond-shuffling mentality is not the one that built Canada or set it on its path of greatness. It takes more than talk and the mouthing of slogans to make private enterprise work."

Editorial in Toronto's Financial Post.

What's Good for One, Good for All

"We members of the petroleum industry face many serious problems—the oversupply of products, the octane race, imports—to name a few. The most serious problem we face is the threat of the deadly hand of government control. We can lick that threat if we work together as a unified straight-thinking group.

"Government control can and will come if we continue to use bad judgment in planning our crude-oil runs and fail to keep imports of crude oil and products in proper balance with domestic availability.

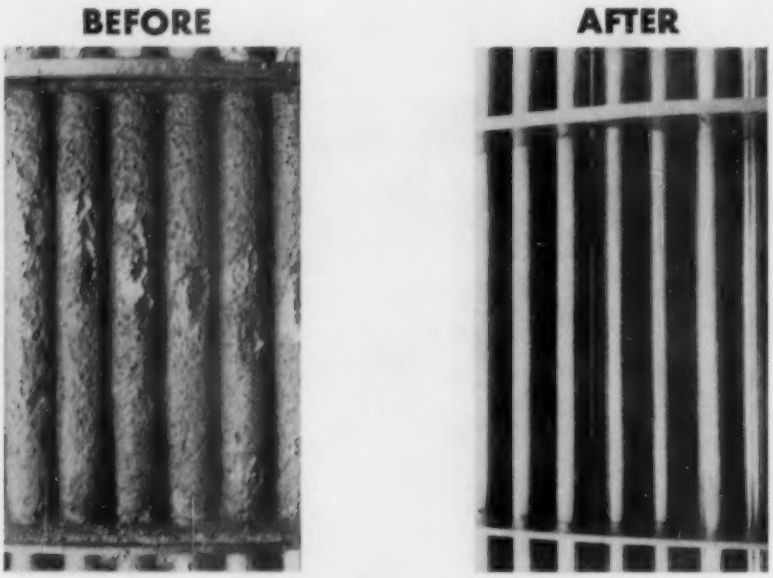
"The large companies are dependent upon the small companies as are the small companies dependent on the large. Each segment of the industry is dependent upon the other segments. For the industry to be healthy each segment of the industry must be healthy. I ask you also to remember that that which is good for the large company is good for the small company, and that which is bad for the large company is bad for the small company, only more so."

Reid Brazell, president of Leonard Refineries, Alma, Mich., in accepting the presidency of the Western Petroleum Refiners Association at a recent San Antonio meeting.

No Need for Revolution

"Soviet scientists should see American capitalism as I have seen it. They would realize that what the Communists call capitalism is the capitalism of the nineteenth century, as it was in the days of Karl Marx. It is not the progressive American capitalism of U. S. oil companies.

"Today big companies have so many stockholder-owners that it is next to impossible to count them. Capitalism here is publicly owned and managed by trained professionals. Under such a



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system there is no need for a revolution."

Leonid P. Smirnow, New York consulting geologist, at the annual Oil Finders Convention.

Quotas Won't Solve Problem

"How to supply a growing American demand without dangerously depleting American oil reserves is the problem for the American oil industry and Congress to decide. The problem will not be solved by imposing quotas for imports that harm the domestic economies of other countries from which oil is now exported to the United States and with which the United States has friendly relations.

"Canada, Venezuela, and Colombia . . . would be dealt a hard blow by the impact of oil quotas. Irreparable injury might be done to the friendship the U.S. now enjoys with these countries . . .

"Too rapid depletion of American oil resources on the other hand, might be disastrous to the U.S. and create a grave emergency if there is another war, even though in the somewhat distant future there is the prospect of other fuels taking the place of coal, oil, and gas."

Editorial in the Beaumont Enterprise.

Liked Exploration Issue

Dear Sir:

I wish to compliment the Journal for the excellent exploration number (April 4, 1955).

I was well impressed with your editorial as well as with numerous other articles in this issue, especially the ones by A. I. Levorsen and Philip C. Ingalls. I was also glad to see you include the numerous articles on uranium.

John T. Rouse
Vice President and Manager Exploration
Mobil Producing Co.
Billings, Mont.

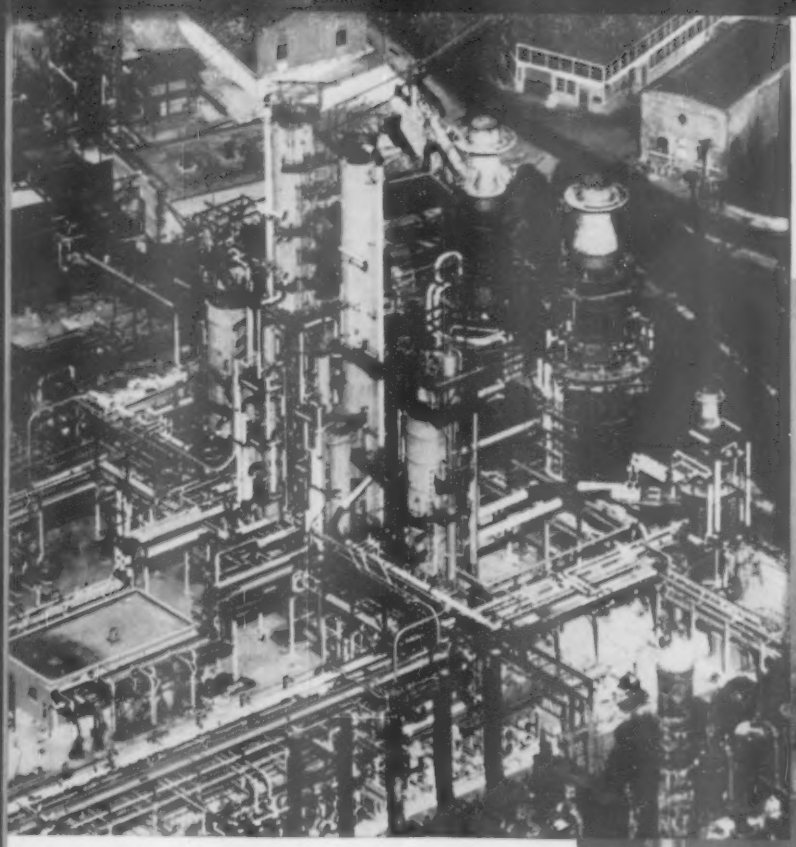
CALENDAR OF EVENTS

APRIL

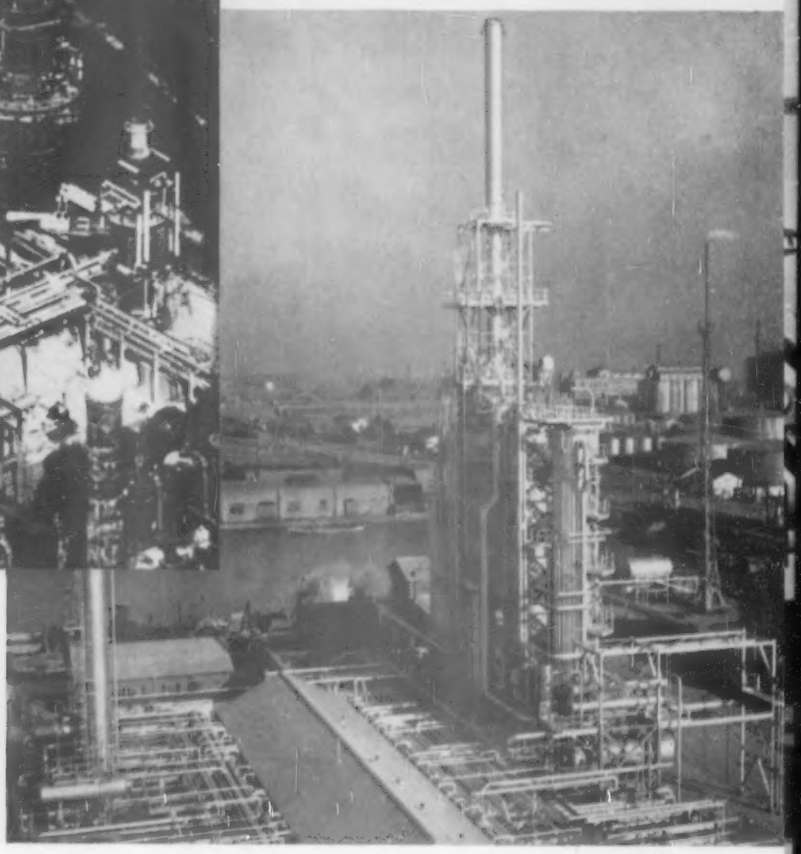
25-26 Independent Petroleum Association of America, midyear meeting, San Antonio.

27 American Society for Testing Materials—DCC, Kansas regional group meeting, Lassen Hotel, Wichita, Kans.

28-29 American Petroleum Institute, Division of Production, spring meeting of Pacific Coast district, Statler Hotel, Los Angeles.



RIGHT IN OUR OWN BACK YARD



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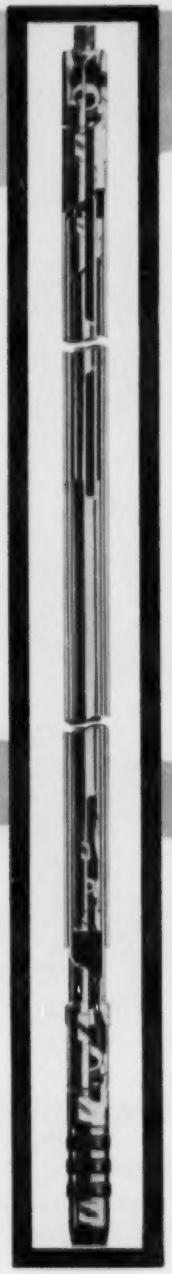

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28-29 Refining Committee, Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver.

29-30 American Association of Petroleum Landmen convention, Hilton Hotel, Fort Worth.

MAY

1-4 Liquefied Petroleum Gas Association, annual convention, Conrad Hilton Hotel, Chicago.

1-4 American Institute of Chemical Engineers, Shamrock Hotel, Houston.

2-3 Pacific Coast Gas Association, gas supply and transmission conference, Palm Springs, Calif.

2-3 Gas Compressors Institute, Legion Hall, Liberal, Kans. Sponsors: University of Kansas and Southwest Kansas Petroleum Industry.

2-6 American Gas Association, Industrial Gas School, Hotel William Penn, Pittsburgh.

5-6 American Association of Oilwell Drilling Contractors, 10th annual drilling industry safety clinic, Baker Hotel, Dallas.

9-10 American Gas Association, Gas Supply, Transmission and Storage Conference, Hotel William Penn, Pittsburgh.

9-11 10th Purdue Industrial Waste Conference, Memorial Union, Purdue University.

9-12 American Petroleum Institute, Division of Refining, midyear meeting, Jefferson Hotel, St. Louis.

11-13 American Petroleum Institute, Division of Production, Eastern District spring meeting, William Penn Hotel, Pittsburgh.

11-13 Canadian Institute of Mining and Metallurgy, Petroleum and Natural Gas Division, annual technical meeting, MacDonald Hotel, Edmonton, Alta.

12-13 Sixth Symposium, "Automation—Engineering for Tomorrow," School of Engineering, Michigan State College, East Lansing, Mich.

12-19 Sixth Latin American Congress of Chemistry, Caracas, Venezuela.

14-22 World Wide Chemical Plant and Equipment Exposition and Congress, Frankfurt, Germany.

16-18 American Petroleum Institute, Division of Transportation, products pipeline confrence, Edgewater Beach Hotel, Chicago.

16-18 Southern Gas Association, New Orleans.

19-20 Society of Exploration Geophysicists, 10th annual Gulf Coast meeting, Plaza Hotel, San Antonio.

20-22 Appalachian Geological Society, Virginia Geological Survey, and West Virginia Geological Survey, spring field conference, Kavannaugh Hotel, Harrisonburg, Va.

23-25 American Petroleum Institute, Division of Marketing, midyear meeting, Chase and Park Plaza hotels, St. Louis.

26-27 Western Petroleum Refiners Association, technical-industrial relations meeting, Settles Hotel, Big Spring, Tex.

26-27 American Institute of Mining and Metallurgical Engineers, Rocky Mountain Petroleum Sessions, Shirley-Savoy Hotel, Denver.

26-27 Kentucky Oil and Gas Association, annual meeting, Lafayette Hotel, Lexington.

30-June 1 Chemical Institute of Canada, thirty-eighth annual conference and exhibition, Quebec City, Que.

JUNE

1-3 Tenth annual Short Course on Gas

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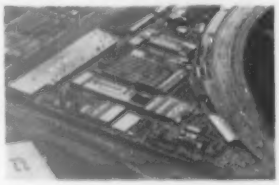

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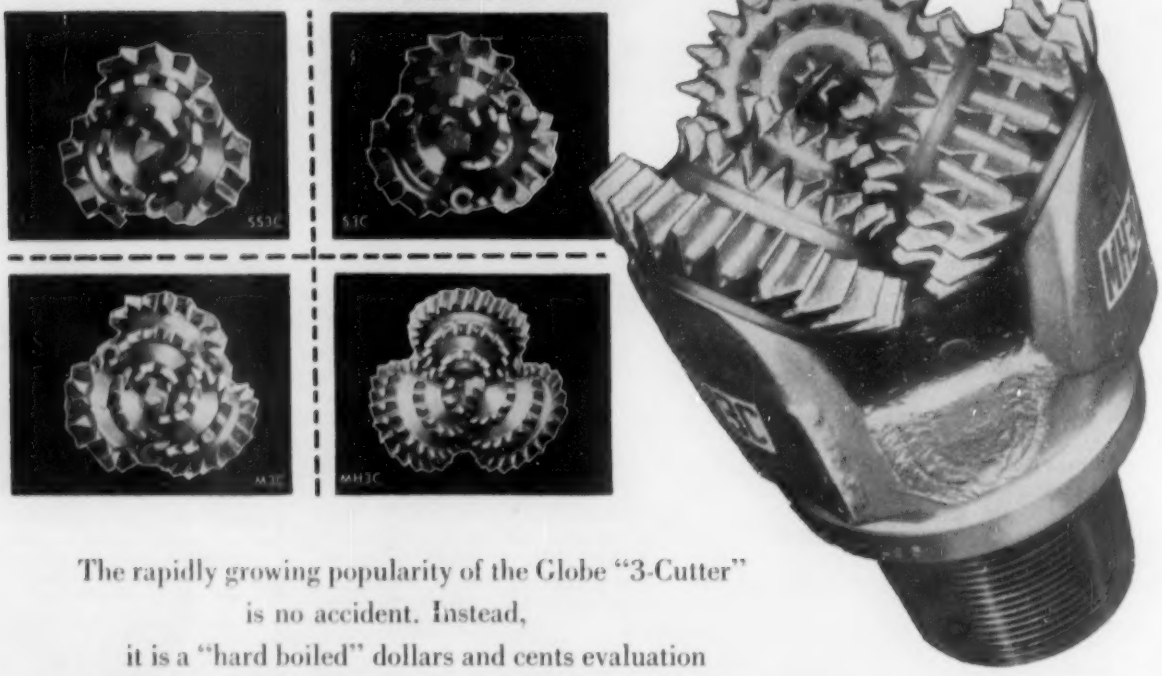

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Technology, Texas College of Arts and Industries, Kingsville, Tex.

5-9 Canadian Gas Association, annual meeting, Sheraton-Broeck Hotel, Niagara Falls, Ont.

6-9 Oil and Gas Power Division, American Society of Mechanical Engineers, 27th annual conference and engineering exhibit, Hotel Statler, Washington, D. C.

6-10 American Petroleum Institute, Division of Production, midyear committee conference, Brown Palace Hotel, Denver.

6-15 Fourth World Petroleum Congress, Rome, Italy.

7-9 National Oil Scouts and Landmen's Association, 32nd annual meeting, Banff Springs Hotel, Banff, Alberta, Canada.

9-10 Natural Gas and Petroleum Association of Canada, Royal Connaught Hotel, Hamilton, Ont.

9-10 Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh.

11-15 Petroleum Equipment Suppliers Association, annual meeting, Banff Springs Hotel, Banff, Alberta, Canada.

12-17 Society of Automotive Engineers, golden anniversary summer meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

16-18 Interstate Oil Compact Commission, Cosmopolitan Hotel, Denver.

17 Northern California Section, American Institute of Chemical Engineers, symposium on waste disposal, University of California, Berkeley, Calif.

20-23 American Society of Mechanical Engineers, semiannual meeting, Statler Hotel, Boston.

23-24 Western Petroleum Refiners Association, technical-industrial relations meeting, Broadview Hotel, Wichita, Kans.

23-26 Rocky Mountain Oil Show, Casper, Wyo.

26-July 1 American Society for Testing Materials, Chalfonte-Hadden Hall, Atlantic City, N. J.

JULY

20-22 Instituto Tecnologico y de Estudios Superiores de Monterrey, first annual short course on instrumentation for industry, campus, Monterrey, N. L., Mexico.

AUGUST

15-17 Society of Automotive Engineers, golden anniversary West Coast meeting, Hotel Multnomah, Portland, Ore.

29-31 15th annual Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

SEPTEMBER

11-13 Independent Natural Gas Association of America, annual meeting, Jasper Park Lodge, Jasper Park, Jasper, Alberta, Canada.

13-24 First International Instrument Congress and Exposition, and ninth National Instrument Conference and Exhibit, Philadelphia.

14-16 National Petroleum Association, 53rd annual meeting, Traymore Hotel, Atlantic City, N. J.

22-23 Western Petroleum Refiners Association, regional technical-industrial relations meeting, Hotel Henning, Casper, Wyo.

22-23 Louisiana - Arkansas Division, Mid-Continent Oil and Gas Association, annual membership meeting, Roosevelt Hotel, New Orleans.

26-28 American Association of Oilwell Drilling Contractors, fifteenth annual meeting, Rice Hotel, Houston.

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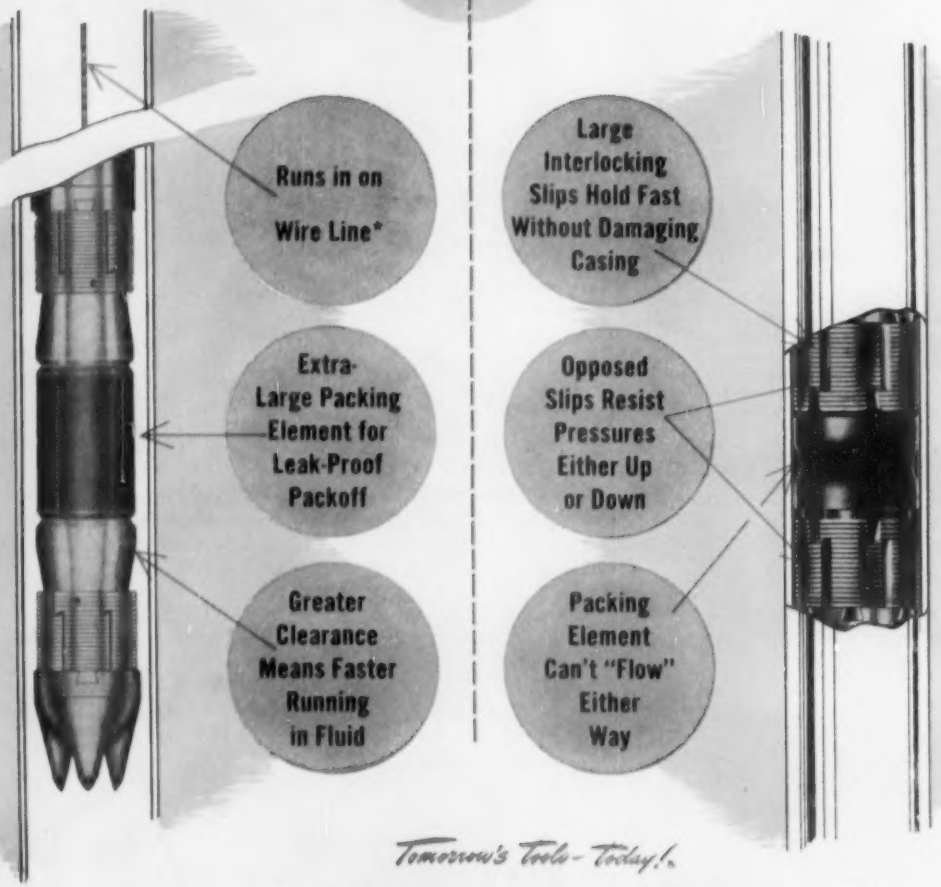
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TULSA, OKLAHOMA

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JOURNALLY SPEAKING . . .

Badge of Courage

IF there's anything we can't stand, it's a man who doesn't have the courage of his convictions.

Such a one is an oil man we see at many conventions and whom we shall mercifully conceal under the pseudonym of Joe Noe.

At a recent convention we ran into Joe Noe early in the first day. We got to talking about the large identification badges which everyone wore on his left lapel.

"You know," said Joe, "a man really ought to wear his badge on the right lapel, so when he shakes hands with somebody the other guy can read his name right off and won't have to crane around on the left for a sneak glance while pretending he remembers your name."

At the moment that struck us as a capital idea. Joe and we agreed to start the new style on the spot, and promptly shifted our own badges to the right lapels.

That badge on our right lapel felt awfully conspicuous. It seemed to stand out like a sore thumb. We felt that an explanation was in order.

"Starting a new style," we volunteered to the man next to us. "Wear your badge on the right side so people can get your name when they shake hands with you."

"I see," he replied. "Might be all right. But I notice that everybody else has his on the left."

We noticed that too. In fact it was overwhelmingly evident. We couldn't spot a single man who didn't have his badge on his left lapel. Except us.

"Joe Noe and I think it's a good idea to wear our badges on the right side," we said to the next man. He was on our left, so he had to peer around on the right to read our name.

"Uh huh," he said, and shook his head in a way that we didn't quite like. We backed away quickly, bumping hard into another guy.

"Joe Noe thinks it's a good idea to wear our badges on the right," we explained pleasantly. This didn't seem to make him feel any better about being almost knocked over, so we kind of sidled over against the wall.

We looked over the crowd—left-lapel badged to a man. The crowd seemed to be looking us over, too. We were sure groups of people were nodding meaningly in our direction, pointing out to each other that a man over there had his badge on his right lapel.

We greeted another acquaintance with our standard explanation:

"Joe Noe talked me into wearing my badge on the right. He thinks people can read it better when shaking hands."

"Maybe so," he said. "Glad to see you anyway."

Apparently Joe hadn't been doing much missionary work. Close scrutiny failed to reveal a single other person with his badge on the right. Across the room a small group of men seemed to be staring at us. If we can read lips, they were saying: "Look at that guy with his badge on the right side. Wonder what the idea is."

Selecting a man who looked as though he might have a tolerant disposition, we tried once more.

"You know this character Joe Noe? Just for a gag he put me up to wearing my badge on the right side."

"Very amusing," the man said. "What did you say your name was?"

Obviously we weren't getting very far with the crusade, so we tried a mass attack on a group of delegates.

"Crazy guy named Joe Noe moved my badge over to the right side. Silly, isn't it?"

"Sure is," they all laughed.

Next morning, when we were changing pencils and stuff from Suit A to Suit B, we found ourselves pinning our badge on the left lapel. "After all," we realized, "that's the natural thing for a right-handed man. Besides, who wants to set a new style, anyway?"

Getting off the elevator, we spotted Joe Noe across the lobby, talking to someone. We sneaked around behind a potted palm and got a look. Joe's badge was on his left lapel.

We avoided Joe the rest of the convention. If there's anything we can't stand it's a man who doesn't have the courage of his convictions.

—*Henry D. Ralph.*

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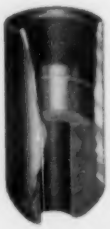
This is Product No. 100—Baker Cement Float Shoe—outstandingly "First" for the safe guiding, floating and cementing of casing. No other shoe can approach its world-wide popularity. Available also in the "whirler" type at a nominal increase in price.

This is Product No. 102—Baker Cement Guide Shoe—used in combination with a Baker Cement Float Collar when one float valve is considered sufficient, and a stop for the cementing plug is desired above the shoe. Also used in combination with Baker FILL-UP Collars or FLEXIFLOW Collars.



This is Product No. 101 M&F—Baker Cement Float Collar, usually positioned just above the shoe joint to provide a "stop" for the cementing plug. Used in combination with any type of Baker Cement Float Shoe, Guide Shoe, or "Whirler" Shoe, selected to meet the customer's specifications.

This is the new Baker Differential FILL-UP Shoe—Product No. 1081—which permits the casing to fill automatically from the bottom (while it is being run) to within 90% of the fluid level of the annulus. By using *both* the FILL-UP Shoe and its companion FILL-UP Collar, an 81% fill is secured. It's new—ask for brochure.

This is the new Baker FLEXIFLOW Fill-Up Shoe—Product No. 160. This feature is also available in a Collar and a "Whirler" Shoe. Permits the casing to fill automatically from the bottom through a flexible, variable orifice—eliminates messy intermittent surface filling, as well as casing overflow—saves landing time and drilling mud—reduces the damaging "Ram Effect." Ask for brochure describing the new FLEXIFLOW Equipment.

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"FIRST" in Successful Results—Success in cementing means only one thing—to secure a permanent, leakproof shut-off with the initial cement job. Baker Equipment offers you the best possible opportunity to secure Successful Results. Accurate threads; the rounded nose on all shoes to guide the casing safely; the efficient Baker Buoyant Ball Valve which seals instantly against the rubber seat when pressure is reversed; the minimum cross-sectional area of "drillable" materials (no metal)—all combine to make Baker "First" in Successful Results.

"FIRST" and ONLY "Whirling" Action provided by baffled side ports in all "whirler" type shoes and collars to wash the formation and then whirl the slurry to aid in perfect bonding of the slurry with the formation.

"FIRST" with new and improved products—such as Baker Differential FILL-UP Equipment and Baker FLEXIFLOW Fill-Up Equipment which permit the casing to fill from the bottom automatically as it is being run. You save time in landing casing—reduce the "Ram Effect" which breaks down potential lost circulation zones—eliminate the hazards and discomfort of surface filling the casing. Ask any Baker representative or office for brochures describing Differential FILL-UP and FLEXIFLOW Fill-Up Equipment.

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Let's make another try at the imports problem

BECAUSE this publication criticized the fuel-oil provision in the Neely amendment to restrict oil imports to 10 per cent of domestic demand, some readers have jumped to the inference that the Journal favors unlimited imports.

This is not true. As succinctly as we can state it, here is our position on imports:

- This country needs some imported oil. But imports, like domestic production, should be tailored to current needs—the general principle of proration to market demand.
- Imports should not be so great as to endanger the health of the domestic industry. Yardsticks for determining this point include drilling rate, reserve ratio, MER, allowables, inventories, demand growth, earnings, investment rate, and similar factors weighted against each other.
- Imports were too high last year. How much will be too much in any future year is impossible to forecast. But both foreign and domestic operators could live for the next couple of years under an import level no higher than 1954's.
- The less government interference in the oil business the better. That goes for imports. Government restrictions on imports should be a last desperate resort. We are not convinced that the industry has yet reached such a pass.

WE ENDORSE THE IMPORTS SECTION of the cabinet committee report on energy supplies and resources policy. All things considered, it seems to be the best possible resolving of conflicting pressures.

Specifically, the Journal joins the cabinet committee in a plea for "voluntary, individual action" to solve the problem, and in the belief that "every effort should be made and will be made to avoid the necessity of governmental intervention."

This report should spur the importers into doing something more tangible than they have done in the past. They now have a government-blessed policy to aim at and the sanction to suggest specific plans.

This administration request for another, more serious effort at industrial statesmanship should not be spurned. Voluntary action should be given one more try during 1955.

IF THIS FAILS, then, as the cabinet report says, "appropriate action should be taken."

Just what sort of action would be "appropriate" need not be decided now. Several courses are possible, and most of them, we believe, would be more appropriate than the Neely amendment now pending in the Senate.

Check and Double Check

✓ THE CEMENT

✓✓ AND THE JOB

Standard Oil Co. (N. J.) Photo

● In line with the ounce-of-prevention precept, the Oil Man checks conditions before cementing a well . . . then double checks by temperature log to see how the cement is distributed around the casing.

There's a parallel in the manufacture of Lone Star Cements for Oil Field service. These cements are checked every step of the way, from raw materials straight through to finished product, one of the most exacting quality-control processes in industry today . . . and double checked in our Oil-Well Cement Laboratory, under simulated field conditions as to pressures, temperatures and sulphate action.

The Oil Operator knows the problems to be met in the well... and there's a Lone Star Cement with the properties and characteristics that will do the job best. It's just a matter of selecting cement to fit the job.

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THIS WEEK . . . . . IN THE NEWS

Imports

● Oil imports during the first 8 months of this year will be almost 14 per cent greater than during the same period of 1954, according to reports filed with the Texas Railroad Commission.

● Imports of both crude and petroleum products reached new highs in February. Total imports averaged 1,412,700 bbl. daily as compared with the previous record of 1,322,000 bbl. in December 1954. Average daily crude imports soared to 753,700 bbl., including 392,600 bbl. a day from Venezuela.

● East Coast refineries, which get most of the crude coming into the U.S., now rely primarily on foreign feed stock. A Journal survey shows imported crude comprised nearly 57 per cent of the total runs of East Coast refineries in 1954. The trend toward reliance on foreign crude continues as more and more Eastern Seaboard refiners join the ranks of importers.

International

● Austria will regain its seized oil properties under terms of the Austrian-Soviet peace treaty announced in Moscow. Russia agreed to return all concessions, exploration rights, refineries, and shares in a joint oil-trading company. Austria agreed to supply about 19,000 bbl. daily of crude to the Soviet Union for 10 years. The United States, Britain, and France have yet to approve the proposal.

● Oil exploration may get under way by foreign interests in Guatemala this summer when new legislation is completed by the government. A law being drafted will give Guatemala 12½ per cent royalty payments, sliding surface land taxes, and 50 per cent of the profits after expenses.

Natural Gas

● Power of the coal industry is behind the push for the Staggers bill. It would prohibit sale of natural gas to industry at less than actual cost plus a reasonable shipping charge. Coal men cite the need for conserving a natural resource from profligate uneconomic use. This is a threat to pipeliners who must make low-cost industrial sales in off seasons to keep heads above water.

● A survey reveals 19 companies control 91 trillion cubic feet of the nation's proven natural-gas reserves. This is 43 per cent of the total reserves.

● A House interstate commerce committee hopes to wind up its hearings into the Harris bill by April 29 and have a revised bill before the House by mid-May. Battle lines are fully drawn on measure exempting from federal control all independent natural-gas producers. Oil and gas industry and pipelines support it while opponents include utilities, and domestic consumers. Coal men back idea of bill but want revisions.

Pipelines

● Trans-Canada may be laying pipe soon. The company has come out with a revived plan that calls for building the east end of the line—from Toronto to Montreal—by the end of the year. The 370-mile line would be supplied by gas imported by T.G.T. The Alberta-Winnipeg section is dead for this year.

● American Louisiana pipeline may also start soon. As FPC hearings opened last week to authorize supplies for the line, Panhandle Eastern was denied permission to oppose American Louisiana. Superior, Kerr-McGee, Stanolind, and British-American plan to supply the 1,120-mile line.

Refining

● Nation's lube-oil capacity is shrinking. Drop of 4.5 per cent in last year is reported by N.P.A. Decline puts capacity now at 175,875 bbl. daily, about the same as 6 years ago.

● L.P.G. is expected to take a bigger share of the motor-fuel market. Tractor use was up 23 per cent last year, other uses 42 per cent, according to L.P.G. Association. N.P.A. is told L.P.G. is ideal for spark-ignition engines, works best in high-compression engines.

Production

● Resentment is rising in Texas against continued increase in foreign crude imports. Texas Railroad Commission reduced the May allowable for oil fields there by 205,902 bbl. daily but only after caustically quizzing one major company representative about his concern's imports.

● Oklahoma's once-dead 25-bbl. minimum allowable bill has staged a quick recovery in the house and is still before the legislature. The house once killed the bill but revived it last week and passed it. The senate promptly sent it to a committee which previously killed a similar proposal.

● Texas natural-gas producers apparently won't get their scheduled tax reduction. They were due a rate drop from 8 to 7 per cent next year, but the house of representatives last week passed an omnibus tax bill which pegged the tax permanently at 8 per cent.

In East Coast refinery runs . . .

. . . Imports Exceed Domestic Crude

Use of foreign feed stock continues to grow as additional Atlantic Seaboard refiners contract for overseas supplies

Dahl M. Duff

NEW YORK.—If you buy a gallon of gasoline refined on the East Coast, there's now a better than even chance that it was made from foreign-produced crude oil.

The extent to which this country's East Coast refineries have taken to foreign crude has been increasing almost steadily since the end of World War II. Last year, crude imports made up nearly 57 per cent of the total runs of these refineries.

These and a few other statistical trends are noteworthy, regardless of where you stand on the import controversy. Aside from the pros and cons of the argument over whether the current level of imports is good or bad, two other significant facts stand out:

. . . Considerably more companies are bringing in foreign oil now than a few years ago.

. . . More and more countries are shipping crude into the United States.

During the past year, the East Coast received 214,608,710 bbl. of foreign crude oil averaging about 587,969 bbl. daily (see table on page 80). Value of this crude was about $487,400,000.

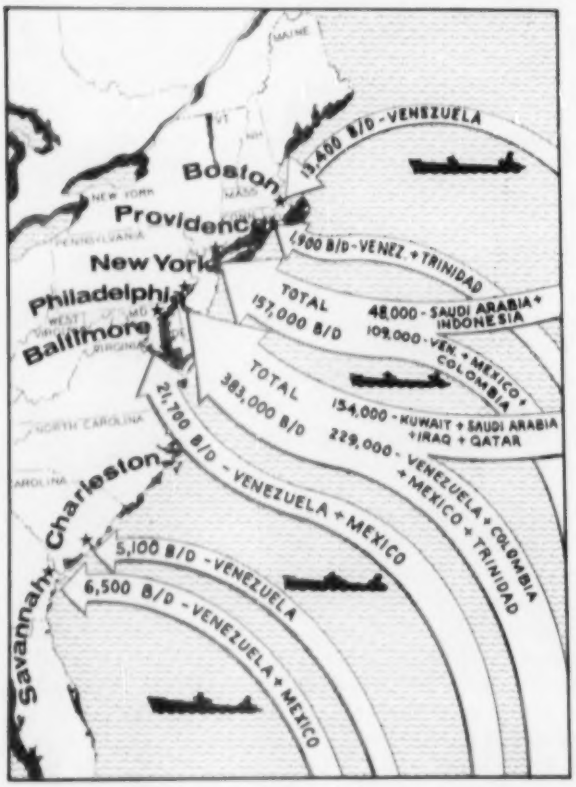
Total U.S. imports in the same period were 242,214,766 bbl. averaging 663,600 bbl. daily. This total consisted of 49,416,520 bbl. under 25° gravity valued at $93,594,747 ($1.89 per barrel average) and 192,798,246 bbl. over 25° gravity valued at $450,581,251 ($2.34 per barrel average). The value is that at the foreign shipping point less freight, insurance, etc.

Significant deal . . . Sun Oil Co.'s deal with British Petroleum Co., Ltd., last winter rounded out the list of East Coast refiners who have decided imported oil is their best bet, considering the foreign f.o.b. price and the prospect of a long period of low tanker rates. At present, there is no major refinery along the Atlantic Coast which doesn't depend to some degree on oil from outside the country. Most of the smaller asphalt plants also charge imported feed stock.

Sun, the last East Coast holdout against large-volume use of imported crude, finally gave in last winter and signed up with British Petroleum for Middle East crude, reportedly 20,000 bbl. daily rising to 35,000 bbl. daily at the end of 5 years. Gossip in the industry is that Sun took the best of several offers and that its deal with B.P. will give it a cut of about 50 cents a barrel of the usual laid-down price.

Actually, the company had been bringing in some oil from Venezuela for a number of years. In 1949, it imported 10,980 bbl. daily from Venezuela, but this was mostly specialty crude. B.P.'s oil, which could be taken from Kuwait or Iran as the sources of the company's main production, will go

Eastern Seaboard crude imports . . . . . and refinery capacity



Company and location—	Cap. in bbl. per stream day
Esso Standard Oil Co., Everett, Mass.	55,000
Total Boston area	**55,000**
American Bitumuls & Asphalt Co., East Providence, R. I.	*1,500
Socony-Vacuum Oil Co., Inc., Providence, R. I.	*8,900
The Texas Co., Providence, R. I.	*3,500
Total Providence area	**13,900**
Socony-Vacuum Oil Co., Inc., Brooklyn	27,800
Gulf Oil Corp., Staten Island, N. Y.	18,800
Tide Water Associated Oil Co.,† Bayonne, N. J.	87,000
Esso Standard Oil Co., Bayonne, N. J.	26,500
Esso Standard Oil Co., Linden, N. J.	170,500
Cities Service Oil Co., Linden, N. J.	15,000
California Oil Co., Barber, N. J.	72,000
Total New York-New Jersey area	**417,600**
The Texas Co., Westville, N. J.	60,000
Socony-Vacuum Oil Co., Inc., Paulsboro, N. J.	105,550
Gulf Oil Corp., Philadelphia	215,340
Atlantic Refining Co., Philadelphia	158,600
Sun Oil Co., Marcus Hook, Pa.	160,950
Sinclair Refining Co., Marcus Hook, Pa.	100,000
The Texas Co., Claymont, Del.	*3,500
Total Philadelphia area	**803,940**
Esso Standard Oil Co., Baltimore	62,000
American Oil Co., Baltimore	*10,000
American Bitumuls & Asphalt Co., Baltimore	*7,500
Total Baltimore area	**79,500**
Esso Standard Oil Co., Charleston, S. C.	*8,700
American Oil Co., Savannah, Ga.	*6,500
Total East Coast capacity	**1,385,140**

*Largely asphalt production. †Operations were suspended at the Bayonne refinery in January 1955. A 130,000-bbl. daily plant will be completed next year at Delaware City, Del.

EAST COAST REFINERIES' CRUDE SUPPLY

(Bureau of Mines' figures in thousands of barrels daily)

By volume and year . . .

	1946	1947	1948	1949	1950	1951	1952	1953	1954
Refinery runs	758	815	867	768	908	1,015	1,029	1,045	1,030
Foreign crude:									
Ven., N.W.I.	205	221	244	231	282	293	326	321	345
Mex., Col., Trin.	31	43	33	39	67	80	58	47	38
Total W. Hemisphere	236	264	277	270	349	373	384	368	383
Saudi Arabia		1	38	33	40	43	68	74	75
Kuwait*			10	64	74	59	72	103	114
Iran, Iraq, Qatar, Sumatra			14	4			2	10	13
Total E. Hemisphere		1	62	101	114	102	142	187	202
Total foreign crude	236	265	339	371	463	475	526	555	585
Domestic crude	522	550	528	399	445	540	503	490	445

As per cent of refinery runs . . .

Foreign crude:									
Ven., N.W.I.	27.0	27.1	28.1	30.1	31.0	28.9	31.7	30.7	33.5
Mex., Col., Trin.	4.1	5.3	3.8	5.1	7.4	7.9	5.6	4.5	3.7
Total W. Hemisphere	31.1	32.4	31.9	35.2	38.4	36.8	37.3	35.2	37.2
Saudi Arabia		0.1	4.4	4.3	4.4	4.2	6.6	7.1	7.3
Kuwait			1.2	8.3	8.2	5.8	7.0	9.8	11.0
Iran, Iraq, Qatar, Sumatra			1.6	0.5			0.2	1.0	1.3
Total E. Hemisphere		0.1	7.2	13.1	12.6	10.0	13.8	17.9	19.6
Total foreign crude	31.1	32.5	39.1	48.3	51.0	46.8	51.1	53.1	56.8
Domestic crude	68.9	67.5	60.9	51.7	49.0	53.2	48.9	46.9	43.2
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Includes Neutral Zone in 1954.

to Sun's 161,000-bbl.-daily refinery at Marcus Hook, near Philadelphia.

The significance of the Sun purchase was mainly in the fact that the imports will come from the Middle East. On the East Coast, there is a group of so-called "minor majors," and during the past few years, one after another of these companies turned to the Persian Gulf for crude to be refined on the East Coast. Sun was the last of this group to fall in line.

Other contracts . . . Details of these long-term Middle East supply contracts are top secret but the results show up in statistics of the three agencies which gather import figures—the Census Bureau, Texas Railroad Commission, and Bureau of Mines.

Recent rumors have it that another contract for more Middle East oil is being negotiated by a large East Coast refiner. In these Middle East crude transactions, the sellers include the major American producers abroad and British Petroleum, as well as the French Cie. Francaise des Petroles which has close to a quarter interest in Iraq and somewhat more crude oil than it can use in its own refineries in France.

Sinclair contracted with Gulf Oil Corp. early in 1953 for Middle East crude, principally from Kuwait, in amounts reported at the time to be between 15,000 and 25,000 bbl. daily for 5 years. Shipments from Kuwait for Sinclair began in April 1953, and last year the company brought in 13,700 bbl. daily from this source, plus another 5,000 bbl. daily from Qatar.

Cities Service Co. in November 1953 signed up with Gulf to take about 20,000 bbl. daily from the Middle East over a 12-year period. Cities Service's only East Coast refinery is the one relatively small plant in New Jersey, but the imports are being processed by Gulf at its large refinery near Philadelphia. Cities Service is building four supertankers to haul Middle East oil and has a 5-year option to use the crude in a new East Coast refinery of its own.

Imported Crude Processed In East Coast Refineries

(As per cent of refinery runs)

	Middle East crude	Total imported crude
1947	0.1	32.5
1948	7.2	39.1
1949	13.1	48.3
1950	12.6	51.0
1951	10.0	46.8
1952	13.8	51.1
1953	17.9	53.1
1954	19.6	56.8

Tide Water Associated Oil Co. is the only one of the group having Middle East production. This is through the Neutral Zone interest of the affiliated Pacific Western Oil Corp. Tide Water's East Coast imports last year included 2,500 bbl. daily from the Neutral Zone, plus small amounts from elsewhere in the Middle East and Venezuela.

Trend continues . . . Tide Water completed the closing of its 87,500-bbl. refinery at Bayonne, N. J., January 31, and it's no secret in the business that foreign crude will make up a large part of the charge of the new 130,000-bbl. refinery which Tide Water is building south of Philadelphia. Since Neutral Zone production is small by standards in the Middle East, a crude supply from one of the major Persian Gulf areas seems likely.

Atlantic Refining Co. was the first East Coast refiner without its own Middle East production to begin importing crude from that region. It started shipping crude from Kuwait during the 1948 shortage, and last year its imports from Kuwait and Iraq amounted to 8,700 bbl. daily. Early in 1954, Atlantic sold its Eastern Hemisphere marketing properties to British Petroleum which is paying Atlantic by furnishing crude oil over a 4 or 5-year period.

Still another possible foreign crude refiner on the East Coast is Standard Oil Co. (Ind.) through its subsidiary, American Oil Co. Amoco is building a new 35,000-bbl. plant at Yorktown, Va., and if it follows the course of its fellow East Coast refiners, it will be using nondomestic crude oil at least in part.

These are the Middle East supply arrangements made by the larger East Coast refiners without Middle East production of their own. These shipments are significant and growing. But by far the largest East Coast imports from the Middle East are made by refiners having their own production in the Persian Gulf — Standard Oil Co. (N. J.); Socony-Vacuum Oil Co., Inc.; Gulf Oil Corp.; Standard Oil Co. of California; and The Texas Co.

Importance of Middle East crude to the Atlantic Coast refining industry has risen sharply in the past 8 years. In 1947, Middle East imports to the East Coast accounted for only 0.1 per cent of the Eastern Seaboard's crude runs. In 1954, they amounted to 19.6 per cent (see table).

Latin American crude . . . Though the hottest criticism of crude imports usually is directed against oil from the Middle East, Latin America and particularly Venezuela still rank as the

East Coast Crude-Oil Imports, 1954

(Bureau of Census figures)

Port of entry and source—	Under 25° gravity	Over 25° gravity	Total
Boston:			
Venezuela	4,100,000	797,710	4,897,710
Barrels per day	11,233	2,185	13,418
Providence:			
Trinidad	101,899		101,899
Venezuela	582,938		582,938
Total barrels	684,837		684,837
Barrels per day	1,876		1,876
New York:			
Mexico	712,867		712,867
Colombia	3,608,818	178,280	3,787,098
Venezuela	9,273,319	25,802,650	35,075,969
Kuwait		108,922	108,922
Saudi Arabia		16,923,340	16,923,340
Indonesia		580,533	580,533
Total barrels	13,595,004	43,593,725	57,188,729
Barrels per day	37,247	119,435	156,682
Philadelphia:			
Mexico	175,091	110,976	286,067
Colombia	103,230	8,435,627	8,538,857
Venezuela	10,831,923	63,489,315	74,321,238
Kuwait (Neutral Zone)	406,035	39,461,744	39,867,779
Saudi Arabia	327,668	11,955,526	12,283,194
Trinidad		357,240	357,240
Iraq		2,188,278	2,188,278
Qatar		1,833,277	1,833,277
Total barrels	11,843,947	127,831,983	139,675,930
Barrels per day	32,449	350,225	382,674
Baltimore:			
Mexico	101,228		101,228
Venezuela	7,824,836		7,824,836
Total barrels	7,926,064		7,926,064
Barrels per day	21,715		21,715
Charleston:			
Venezuela	1,871,127		1,871,127
Barrels per day	5,126		5,126
Savannah:			
Mexico	284,128		284,128
Venezuela	2,080,185		2,080,185
Total barrels	2,364,313		2,364,313
Barrels per day	6,478		6,478
Over-all total, barrels	42,385,292	172,223,418	214,608,710
Barrels per day	116,124	471,845	587,969

Port of entry refers to Customs District.

major source for the East Coast refineries. Caribbean or Mexican imports are brought in by all the major East Coast importers, the five international companies as well as the smaller ones. Of all the important East Coast refiners, only Cities Service, Tide Water, and Sun lack sizable producing operations of their own in Venezuela, and these have-nots buy Venezuelan oil.

Last year's figures (Bureau of Mines) show that for every barrel of crude imported on the East Coast from the Eastern Hemisphere — meaning the Middle East—1.9 barrels came in from Venezuela and elsewhere in Latin America. Latin America provided 37.2 per cent of the crude processed in 1954 on the East Coast. The fact is that both the Middle East and Latin America have been expanding as suppliers for the seacoast refineries at the expense of domestically produced oil.

While Middle East crude accounted for only 19.6 per cent of East Coast refinery runs last year, Latin American imports accounted for 37.2 per cent. Bureau of Mines figures show all East Coast imports were 32.5 per cent of the area's crude runs in 1947 as compared with 56.8 per cent in 1954 (see table).

Thus, while it was a better than 50-50 chance last year that any given gallon of petroleum product refined along the East Coast was foreign-derived, the odds that it came from Venezuela oil were something like one in three, and from the Middle East, slightly less than one in five.

Refining centers . . . By far the biggest center for refining imported crude on the East Coast, and in the United States for that matter, is Philadelphia (see map.) Last year a total of 139,675,930 bbl., for an average of about 383,000 bbl. daily, was shipped up Delaware River where six of the country's largest refineries are located.

Approximately 40 per cent of Philadelphia's crude imports were from the Middle East, and the rest from the Caribbean, principally Venezuela. When the new Tide Water refinery is finished, the Philadelphia - Wilmington section will have the world's largest refining concentration *(The Oil and Gas Journal, March 7, page 81).*

Second largest movement of imported crude was into the New York-New Jersey port. Last year refineries in this area took about 157,000 bbl. daily from foreign sources, of which about 48,000 bbl. daily, or slightly more than 30 per cent of the total, came from the Eastern Hemisphere.

Newcomers . . . Another fairly apparent angle in the import picture is that there are a number of newcomers getting into the business or considering it very seriously. These are the seacoast refiners, not only on the East Coast but elsewhere in the country, who are finding the economics of running foreign oil in their plants appealing in view of their present narrow margins of profit.

Three additional companies operating east of the Rockies showed up in the statistics last year as importers from the Middle East. These were Cities Service, Tide Water (taking Neutral Zone oil), and Eastern States Petroleum Corp. for its Houston refinery.

Two other companies began moving in Mexican crude for the first time. These are Southwestern Oil & Refining Co., Corpus Christi, and McBride Oil & Gas Co., Brownsville, Tex.

The number of companies that applied for a share in the Iranian consortium reflects the attraction that a source of crude oil in this prolific Persian Gulf region holds. Better than 30 individual firms originally asked to be included. The 12 finally approved included four substantial East Coast companies—Atlantic, Cities Service, Tide Water, and Sinclair.

Big importers lag . . . In 1948, crude-oil imports by the five major U.S. companies operating abroad—Jersey Standard, Socony-Vacuum, Standard of California, Texas, and Gulf — amounted to some 261,000 bbl. daily, or 76 per cent of the U. S. total. In 1953, the

percentage of total imports made by these same companies was 71.

In 1954, the proportion of imports by the five international companies to total imports was down to 67½ per cent. And for 1955, imports by these same companies will fall to 62 per cent. These percentages are based on the Texas Railroad Commission's breakdown of company imports, actual and projected.

These figures stress the fact that more and more oil is being brought in by companies that are foreign producers only secondarily, or not at all. A trend like this raises questions as to how effective a voluntary agreement curtailing imports would be. Cuts by the larger companies could be taken up in increasing shipments by the smaller ones and by the new importers.

New sources . . . What is true of the importing companies also holds good in a general way for the crude exporting countries. There are considerably more of them figuring in the U.S. import trade than was the case several years back.

In 1946, the first year after the war, crude-oil imports into the United States came from only from four countries—Venezuela, Colombia, Mexico, and Kuwait. By 1948 three more major Middle East countries—Saudi Arabia, Iraq, and Iran—were added to the list.

Last year the total was up to 13 and included practically every producing country that had surplus crude and a few that didn't have. Besides the same seven shipping oil into the United States in 1948, there were Canada, Trinidad, Ecuador, Peru, Qatar, and Indonesia. Out of these 13 countries, all but four—Indonesia, Peru, Ecuador, and Canada—were contributing to the inflow on the East Coast.

West Coast imports . . . Indonesian imported crude last year came from Caltex's Minas field in central Sumatra and was landed on the West Coast—9,773,329 bbl. at San Francisco and 3,474,342 bbl. at Los Angeles—to give additional high-gravity crude for California refineries.

A total of 608,620 bbl. of Peruvian crude was shipped to Los Angeles, and 300,320 bbl. went there from Ecuador. All was over 25° gravity. In both these South American countries, internal demand has risen to the point where heavy fuel oil is in short supply on the domestic market, and this product is being imported.

Canadian crude mainly from Alberta began to come into the United States in some volume in 1954. In the Seattle area, where General Petroleum Co.'s new Ferndale refinery came on stream near the first of this year, 910,216 bbl. of Canadian crude and 385,920 bbl. from Venezuela (both over 25° gravity) were imported last year. Another 1,688,967 bbl. of Canadian crude was shipped into the Duluth point of entry, and 7,254 bbl. under 25° gravity came in at Detroit.

Gulf Coast . . . On the Gulf Coast, in the middle of one of the country's best producing sections, imports in 1954 amounted to 6,505,303 bbl., averaging about 18,000 bbl. daily, and still only a fraction of the area's refinery runs. At Brownsville, it was Mexican crude, 658,820 bbl. under 25°, and 821,017 bbl. over 25°. Galveston took 1,481,388 bbl. under 25° from Mexico, 668,873 bbl. under 25° from the Neutral Zone, and 382,692 bbl. of lighter Venezuelan oil. New Orleans took 329,141 bbl. from Colombia, and 586,869 bbl. from Venezuela, all under 25°. Another 1,576,503 bbl., under 25°, went into Mobile, Ala., from Venezuela.

Along with everything else there was actually some heavy Mexican crude shipped last year into refinery-less Florida. The quantity was 691,107 bbl. Best explanation is that it was used directly as fuel in Florida and adjacent states. Another almost negligible import, in the same probable category of use, was the 116 bbl. of heavy Mexican crude oil that came into the United States via. Nogales, Ariz.

Imports Records Fall

All-time highs set in both crude and product imports in February; total imports averaged 1,412,700 bbl. daily

TULSA.—Total imports of crude and products reached a new all-time high in February, and five other import records were set.

. . . Total imports averaged 1,412,700 bbl. daily. The previous record was set in December 1954 with 1,322,000 bbl. daily.

. . . Product imports averaged 659,000 bbl. daily, a new high and the first time product imports exceeded 600,000 bbl. daily. The old record was held by December of last year with 578,000 bbl. daily.

. . . Total crude imports moved up to 753,700 bbl. daily to set the third new record. The former peak was 744,000 bbl. daily, reached last December.

. . . Crude from Venezuela averaged 392,600 bbl. daily compared with the old December record of 386,900 bbl. daily.

. . . February residual imports averaged 588,800 bbl. daily, up from the former record of 573,300 bbl. daily set in January of this year.

. . . Products other than residual fuel set a new high with an average of 70,200 bbl. daily.

Light crude, 25° gravity and over, represented 79 per cent of total crude imports in February. Of total crude imports, 87.2 per cent came to the East Coast, 2.9 per cent to Gulf Coast, 9.2 per cent to West Coast, and 0.7 per cent to Great Lakes area.

Exports of crude and products, excluding shipments to territories, averaged 316,000 bbl. daily in February compared with 283,000 bbl. daily in January and with 312,000 bbl. daily in February 1954.

Decreases from January were reported for gasoline and distillate fuel. Crude, kerosine, residual, lubricants, and other products gained for the month.

Import-export data are compiled by the Census Bureau of the Department of Commerce.

IMPORTS INTO CONTINENTAL U. S.

(Thousands of barrels)

	Feb. 1955	Jan. 1955	Feb. 1954
Crude—			
Mexico	863	635	280
Colombia	568	721	1,193
Venezuela	10,993	10,600	8,944
Peru	120	121	
Trinidad			112
Ecuador			90
Kuwait	3,927	4,604	2,432
Saudi Arabia	2,276	1,976	2,271
Neutral Zone	194	577	
Iraq	347		406
Qatar	146	419	278
Canada	569	527	193
Far East	1,100	619	1,726
Total crude	21,103	20,799	17,925
Daily average	754	671	640
Products—			
Residual fuel	16,487	17,773	13,217
Other products	1,965	1,730	897
Total products	18,452	19,503	14,114
Daily average	659	629	504
Total all oils	39,555	40,302	32,039
Daily average	1,413	1,300	1,144

EXPORTS*

	Feb. 1955	Jan. 1955	Feb. 1954
Crude	976	381	795
Gasoline	1,695	1,962	2,340
Kerosine	326	109	609
Distillate fuel	870	1,755	1,232
Residual fuel	2,987	2,837	1,751
Lube oils	1,100	900	1,292
Other products	907	830	725
Total all oils	8,861	8,744	8,744
Daily average	316	283	312

*Excludes shipments to territories.

Imports Take Big Jump

Movement of crude and products into United States for first 8 months will be 14 per cent above same period last year

AUSTIN.—Total crude and product imports for the first 8 months of this year will average almost 14 per cent more than for the same period of 1954.

Importing companies' reports to the Texas Railroad Commission show that operating plans call for imports of 1,094,400 bbl. daily for the January-August period this year compared with actual imports by these companies averaging 960,700 bbl. daily during the same months of 1954.

These companies do not account for all of this country's imports, but the missing part is so small that the reported totals are definite indicators of import trends.

These reports show that the largest percentage increases for 1955 probably came in the first quarter of the year. Reports to the commission indicate a gain of 17 per cent in total imports for the first quarter compared with the same months of 1954. Actual imports in the first quarter of 1954 represented a gain of 1.6 per cent over the first quarter of 1953.

Importing companies forecast their imports for the second quarter at 1,044,700 bbl. daily or 13.7 per cent more than for the second quarter of 1954. Second quarter imports last year were down 5.7 per cent from imports in the corresponding quarter of 1953.

July imports will be only about 4 per cent above July last year, but the small gain is due in part to the high import level for July 1954.

Product imports for the first 8 months of the year will show a slightly larger percentage gain than crude. Programs for product imports show a gain of 14.3 per cent for the 8-month period compared with 13.7 per cent for crude.

Current reports indicate that some import plans have been revised downward since the first of the year. At the end of January, companies reporting to the commission estimated their imports for the first quarter at 1,240,200 bbl. daily. Actual company imports for this quarter averaged 1,220,000 bbl. daily, down 20,200 bbl. daily.

Latest estimates for the second quarter show an average of 1,044,700 bbl. daily, a reduction of 27,000 bbl. daily from the estimate made in January.

These small reductions represent a net balance of larger cuts by some importing companies and increases by other importers.

CRUDE IMPORTS*

(Thousands of barrels daily)

	1954 actual	1955 actual	Per cent change
January	600.8	716.8	19.3
February	609.1	747.3	22.7
March	642.3	721.4	12.3
First quarter	617.7	727.9	17.8
	1954 actual	1955 forecast	Per cent change
April	571.8	692.4	21.1
May	723.5	740.4	2.8
June	617.5	750.9	21.6
Second quarter	638.5	728.0	14.0
July	678.8	705.4	3.9
August	654.2	730.7	11.7

*From company reports to the Texas Railroad Commission.

PRODUCT IMPORTS*

(Thousands of barrels daily)

	1954 actual	1955 actual	Per cent change
January	450.5	508.1	12.8
February	482.6	519.0	7.5
March	346.9	451.8	30.2
First quarter	424.8	492.1	15.8
	1954 actual	1955 forecast	Per cent change
April	301.0	329.6	9.5
May	272.2	311.7	14.5
June	268.8	309.0	15.0
Second quarter	280.6	316.7	12.9
July	254.9	267.7	5.0
August	218.1	266.4	22.1

*From company reports to the Texas Railroad Commission.

Here Are Companies' Import Figures

	Actual*		Estimated or forecast*				
	Mar. 1954	Mar. 1955	Apr. 1955	May 1955	June 1955	July 1955	Aug. 1955
CRUDE—EAST COAST:							
Atlantic Refining Co.	62.2	67.8	62.0	62.0	62.0	62.0	62.0
Cities Service Co.	8.1	42.4	11.6	33.6	49.8	17.5	36.8
Eastern States Petroleum Co.	6.5	9.1	8.3	20.3	20.3	20.3	20.3
Gulf Oil Corp.	105.0	132.0	115.0	117.0	115.0	115.0	115.0
McBride Oil & Gas Corp.		3.2	3.3	6.5	6.6	6.4	6.4
Phillips Petroleum Co.	6.3	6.4	10.0	9.7	10.0	9.7	9.7
Sinclair Oil Corp.	72.3	65.7	66.0	66.0	66.0	66.0	66.0
Socony-Vacuum Oil Co.	87.5	80.1	85.0	75.0	75.0	67.0	64.0
Southwestern Oil & Refining Co.		7.3	7.6	3.6	3.7	(1)	(1)
Standard Oil Co. of California	93.9	64.2	73.4	73.4	73.4	73.4	73.4
Standard Oil Co. (Ind.)	16.1	9.9	17.5	16.4	16.8	16.3	16.3
Standard Oil Co. (N. J.)†	87.0	87.0	79.0	79.0	79.0	79.0	79.0
Sun Oil Co.	7.3	13.3	7.5	21.4	23.2	27.3	27.3
The Texas Co.	52.0	66.5	57.7	65.0	69.2	67.2	66.4
Tide Water Associated Oil Co.		11.0	11.5	10.8	4.0	10.8	10.8
Total East Coast	604.2	665.9	615.4	659.7	674.0	637.9	653.4
CRUDE—WEST COAST:							
Socony-Vacuum Oil Co.		27.5	27.0	27.0	27.0	27.0	27.0
Standard Oil Co. of California	14.0	8.9	15.7	15.7	15.7	15.7	15.7
The Texas Co.	5.5	11.8		7.4	11.0	5.0	5.0
Tide Water Associated Oil Co.	18.6	7.3	34.3	30.6	23.2	19.8	29.6
Total West Coast	38.1	55.5	77.0	80.7	76.9	67.5	77.3
Total crude	642.3	721.4	692.4	740.4	750.9	705.4	730.7
PRODUCTS:							
Asiatic Petroleum Co.	6.2	11.5	4.8	3.0	8.0	7.5	7.0
Eastern States Petroleum Co.	25.8	25.0	17.3	17.3	17.3	17.3	17.3
Gulf Oil Corp.	11.0	4.0	6.0	4.0	6.0	6.0	6.0
Shell Caribbean Petroleum Co.‡	109.0	151.0	100.0	75.0	80.0	70.0	74.0
Shell Oil Co.	20.6	24.4	17.8	19.4	20.1	19.5	18.1
Socony-Vacuum Oil Co.	9.6	4.1	8.3	8.3	8.3	8.3	8.3
Standard Oil Co. (Ind.)§	12.3	15.8	19.4	28.7	13.3	9.7	9.7
Standard Oil Co. (N. J.)†	149.0	216.0	156.0	156.0	156.0	126.0	126.0
The Texas Co.	3.4					3.4	
Total products	346.9	451.8	329.6	311.7	309.0	267.7	266.4
Total crude and products	989.2	1,173.2	1,022.0	1,052.1	1,059.9	973.1	997.1
Bonded fuel included¶	49.8	79.9	72.6	70.4	75.6	76.0	75.4

*From company reports to the Texas Railroad Commission. †Based on quarterly estimates. ‡Imported by independent distributors. §Received through suppliers who can furnish either domestic or foreign oil. ¶Mostly duty free for bunkering ships in foreign trade. (1)Unable to forecast.

Montreal has priority in . . .

. . . New Trans-Canada Plan

CALGARY.—The eastern end of the proposed Trans-Canada pipeline may be built and in operation before the end of the year.

This announcement, made by N. E. Tanner, president of Trans-Canada Pipe Lines, Ltd., reversed earlier speculation that construction of the big gas-transmission system would start on the western end.

Tanner told a group of Calgary oil men that it will be impossible to start the Alberta-Winnipeg section of the line this year. He indicated, however, that the $29,000,000 Toronto-Montreal leg will be built immediately.

Under the new plan, the Montreal area will be served with gas imported from the United States until completion of the Trans-Canada line. Then, Alberta gas will replace the U.S. supply.

Actually, as it will stand before construction of the entire line, the Toronto-Montreal section will be an extension of Trans-Canada's Niagara-Toronto line now in service.

It will use gas purchased from Tennessee Gas Transmission Co. to build up Ontario markets. Under its contract with T.G.T., Trans-Canada can cut off its U.S. gas supply as soon as Alberta gas reaches the east.

New goal . . . The numerous transactions required to build the 370-mile Toronto-Montreal link are nearly finished. The line is expected to be carrying gas by next fall.

Before Tanner's announcement, there were indications that construction would start this year on the western end of the system, from the Alberta-Saskatchewan border to Winnipeg *(The Oil and Gas Journal, April 18, page 114)*. This phase of the project also would include a spur line from Winnipeg south to Emerson, Man., near the U.S. border. From there, gas would be moved through Northern Natural Gas Co.'s proposed line to the Minneapolis area.

Tanner said his company proposes to renew its contract with Northern Natural, of Omaha. Under this contract, Trans-Canada was to supply 100,000,000 cu. ft. of gas daily during the first year of operation and 150,000,000 cu. ft. daily in the second year.

The Trans-Canada president also expressed the hope of working out new purchase agreements with Alberta gas producers to supply its 2,200-mile system. Early construction of the big cross-Canada line appeared to be doomed a month ago when Trans-Canada failed to obtain the necessary financing. Some of the big gas producers objected to the plan under which the Canadian Government would help finance the line *(The Oil and Gas Journal, March 28, page 96)*.

Tanner cited several factors ruling out the possibility of a 1955 start on the Alberta-Winnipeg section. Financing has not been completed, the Winnipeg and Minneapolis markets could not convert for use of gas by fall, and it is too late to order the 34-in. pipe. Diameter of the $300,000,000 line would dwindle from 34 in. on the west end to 24 in. between Toronto and Montreal.

Government prodded . . . A suggestion that the Canadian Government either put up or shut up regarding its insistence on an all-Canadian route for the 2,200-mile line has been made by Winnipeg & Central Gas Co.

The company contended the government should either take the action necessary to implement its gas policy or change that policy. This apparently was an invitation for the government to put some money into the project.

It has been estimated that building the line along the all-Canadian route backed by the government would cost $40,000,000 more than if the line went south of the Great Lakes.

Broad Gas Policy

Canadian party also asks end to pipeline subsidies

CALGARY.—A broad Canadian gas export policy and elimination of subsidies for constructing natural-gas pipelines were recommended in a resolution approved by the Alberta Progressive Conservative Association at its annual convention here.

The resolution urged the Alberta and Canadian governments and the National Conservative Association to adopt "a bold and realistic natural-gas policy based upon sound economics and cooperation between Canada and the United States to provide adequate revenues to Canadian producers and provision of natural gas at a minimum cost to consumers and elimination of subsidies for pipeline construction."

C. O. Nickle, a member of parliament for Calgary south, said that a pipeline could have been built a few months ago from Alberta to Saskatchewan, Manitoba, and into the United States via Minneapolis. He declared the project collapsed because the Canadian Government forgot the basic facts. The gas must be sold at a price reasonable to the consumer and the producer, he said.

Nickle pointed out the Progressive Conservative party is the only political party on record supporting a broad export policy.

Canadian Briefs

CALGARY. — Consolidated East Crest Oil Co., Ltd., has purchased about two-thirds of the common stock in Citation Oils, Ltd., and probably will operate it as a Consolidated subsidiary.

CALGARY.—Assets of Antone Petroleums, Ltd., will be acquired by American Leduc Petroleums, Ltd. Antone shareholders, if they approve the plan, will receive one share of American Leduc for each three shares of Antone.

BANFF.—The fourth annual Alberta oil well drilling safety clinic will be held at the Banff School of Fine Arts May 5-6. It is sponsored by the Canadian Association of Oil Well Drilling Contractors, the Canadian Petroleum Association, the Alberta Workmen's Compensation Board, and the extension department of the University of Alberta.

CALGARY. — Naco Limited will change its name to Western Naco Petroleums, Ltd., and seek Alberta Supreme Court approval of a new capitalization plan. Under the proposal present shareholders would receive one share issue for each four held.

CALGARY.—Canadian Western Natural Gas Co., Ltd., plans to spend $2,734,000 this year expanding its system. Largest project is a $1,200,000 extension of service to the Alberta towns of Raymond, Magrath, and Cardston.

CALGARY.—Gibson Crude Oil Purchasing Co., Ltd., will start work on a 3-mile, 3½-in. crude pipeline from St. Albert field to tie in with Imperial Oil facilities at Acheson field. Cost is estimated at $40,000.

Diesel Lubes Challenging

Railroads not satisfied with some of today's products; use of cheap fuel may bring new lubrication problems

George H. Weber

CLEVELAND.—American railroads are not too happy about the diesel lubes they are using today. Engine builders and oil refiners are not satisfied either. The three industries need to compare notes more.

These are the conclusions of a symposium held during the closing session of the National Petroleum Association's fifty-second semiannual meeting here.

Chances are diesel lubrication problems will get worse before they get better. Railroads are eying "economy" diesel fuels which will place higher requirements on lubes. There is also a trend to higher-output engines which will impose more severe operating conditions.

Diesel lubes need to do many things today. They have to lubricate engines, and clean them, and cool them. They have to carry dirt and combustion products to filters for removal. Further, they have to be noncorrosive to many metals they contact, and must tolerate moderate amounts of water and fuel dilution.

Better testing urged . . . Most commercial lubes now in use by American railroads are superior in the majority of these requirements, said R. W. Seniff of the Baltimore & Ohio Railroad. But one weakness in an oil may cause a lot of trouble. While a railroad's lube-oil bill may represent only 2 or 3 per cent of total operating costs, the maintenance troubles which can arise from faulty performance in any one of several duties can amount to a large and preventable additional cost, Seniff said. He deplored the lack of progress which has been shown in laboratory and field testing of lubes. He said data released from such tests are incomplete.

This lack of exchange of complete testing information makes the qualification of an oil for railroad service a very costly thing, he said. He called for the following:

. . . **Better correlation** between laboratory and service experience.

. . . **Improved understanding** and a more sympathetic approach to the other fellow's problems in making, using, and designing for proper diesel lubrication.

. . . **More coordination** and cooperation at the technological level in the oil, railroad, and engine industries.

These points were raised by others in the symposium. Everyone is concerned with what might happen as railroads lower their fuel standards and raise their engine-output levels.

Railroads are expected to consume 50 per cent of all diesel fuel by 1960. The increasing demand, coupled with rising costs of prime straightrun fuels, is causing them to resort to cheaper fuels with higher sulfur, heavier ends, and lower cetane numbers.

Since fuel amounts to more than 60 per cent of their operating costs, rairoads can save by reverting to these economy fuels. The standards may be lowered to admit fuels with 1 per cent or more of sulfur, cetane ratings down to 35, end points of over 700° F., pour points above 50° F., and increased carbon residue and sediment. Some lab tests comparing premium fuels with what are currently considered to be economy fuels, have failed to reveal any higher-quality requirements on lubes. But this may not hold for the poorer fuels that railroads will probably burn in the future.

Cooperation needed . . . Anyway, many users are skeptical of the value of certain laboratory tests on diesel lubes. They find a poor correlation with their own results in service. There is a real need for the three industries to get together and set up some system for testing lubes without having to go through the very exhaustive acceptance programs required by many railroads.

Refiners would welcome this. Representing them, R. J. Finney of Cities Service Research & Development Co. agreed with suggestions the Association of American Railroads made last fall. These called for a uniform test code to do two things. First, new lubes should be screened in the laboratory. Second, those passing this preliminary test should be road tested in such a manner that individual railroads can decide for themselves whether their minimum requirements are met. The system should be started, and soon, Finney said.

Finney presented a case for high viscosity index oils in railroad use. He noted a bias against high V.I. oils as such, among railroads, and cited a lack of uniformity in testing and acceptance procedures among the various roads. Railroads' reluctance to take on these exhaustive acceptance tests was also noted. The new engines now being developed, as well as current rolling stock, would show less wear, lower oil consumption, and reduced maintenance cost through use of properly compounded, high-viscosity oils, he said.

Lube-Oil Capacity Shrinks

CLEVELAND.—U. S. capacity for producing lubricating oils now stands at about the same level as 6 years ago. Due to the closing of one major plant and the reduction of operations in another, the nation's total dropped 4.5 per cent from that of January 1, 1954.

The current survey, released by National Petroleum Association, shows 59 operating plants as of January 1, 1955, with an aggregate capacity of 175,785 bbl. per day. Fading exports have offset a slow domestic-demand increase during the past few years to account for the static situation in lube capacity.

But last year showed the greatest drop in total capacity in history. This was due mainly to the closing of the Tide Water Associated Oil Co. refinery at Bayonne, N. J., and the reduction in lube operations which attended Esso Standard Oil Co.'s new emphasis on waxes in the same city. Together, they amounted to a withdrawal of more than 8,000 bbl. per day.

CAPACITY OF U. S. LUBRICATING-OIL PLANTS

(Barrels per day)

	1955	1954	1953	1952	1949
Finished lube capacity	175,785	184,000	181,687	187,793	175,847
Conventional	16,600	18,200	20,485	20,585	21,489
Solvent refining	159,185	165,800	161,202	167,208	154,358
Solvent extraction	199,200	205,500	198,100	198,750	184,020
Solvent dewaxing	136,205	139,345	136,245	136,025	123,808
Propane deasphalting	60,400	62,800	60,950	58,250	60,000

Moderate increases in throughput capacity were noted in a number of other refineries, mainly by addition of new equipment and bottleneck removals. The older, "conventional" plants employing only vacuum distillation, acid treating, and clay contacting, continue to fall by the wayside. They now account for only 9.5 per cent of total capacity as compared with 12 per cent in 1949.

Partially offsetting the closing of six lube plants during the past year were expansions in several existing refineries, ranging up to 1,000 bbl. per day. No new plants were built during the past year, and none has so far been contracted this year. Practically all of the free world's new lube capacity added during the past 6 years has been in foreign refineries, principally in Europe, Mexico, and South America.

Deep Rock Sale Effective

TULSA.—Sale of Deep Rock Oil Corp. refining, marketing, and pipeline facilities to Kerr-McGee Oil Industries, Inc., was announced last week. The sale became effective April 1.

The transaction also gives Kerr-McGee $5,000,000 in cash plus most of Deep Rock's undeveloped leases. In return, Deep Rock will get $17,000,000 in Kerr-McGee preferred stock plus a production payment of $3,000,000 or 5 per cent gross from the transferred leases.

The Deep Rock activities will be operated as a division of Kerr-McGee, and refined products will be sold under the present brand name. Deep Rock will change its name and continue to operate as a producing, royalty, engineering, and investment company *(The Oil and Gas Journal, April 18, page 101).*

New Labor Union Formed

BAYONNE, N. J.—The C.I.O. Oil, Chemical and Atomic Workers Union faced some unexpected competition last week in its campaign to organize employes of Standard Oil Co. (N. J.).

Three independent unions representing Esso Standard Oil Co. workers merged into what they hope will become a nationwide bargaining group for Jersey Standard employes. Known as Esso International Union, the group now claims 4,000 members here and at Baltimore. A spokesman for the group said other unions in the Jersey organization plan to vote on a proposal to merge with the new union.

The C.I.O. recently announced plans to recruit members among Standard of Jersey workers. It has started an organization campaign at the Bayonne plant.

Coal Scheme Attacked

Merriam tells N.G.A.A. coal industry trying to saddle ban against below-cost-sales on nation's natural-gas pipelines

DALLAS.—Look out for coal! This alert was sounded last week for all who produce, process, pipeline, or distribute natural gas.

It came from John F. Merriam, president of the Independent Natural Gas Association of America and of Northern Natural Gas Co., Omaha. Merriam was principal speaker at the concluding general session here of the Natural Gasoline Association of America's 1955 annual meeting.

Merriam told the N.G.A.A. the coal industry is making a powerful and ingenious effort to profit from the gas producers' struggle to escape from federal pricing of gas at the wellhead.

Coal in fight . . . Coal has thrown its entire weight in this effort behind the Staggers bill. This proposal, Merriam said, would prohibit sale of natural gas to industry at less than actual cost plus a reasonable shipping charge.

Coal is appealing vigorously for support of this bill using the theme that it would serve the best interests of the public and the national defense. Coal spokesmen argue that "below-cost sales" are a waste of a wonderful natural resource (gas) and are ruining a defense-essential industry (coal).

These arguments appear reasonable to those not closely acquainted with how the gas industry operates, Merriam said, and for that reason are hard to counter.

Those in the gas industry, he said, know that the key to a pipeline's success is its load factor. Since the bottom drops out of the pipeline's residential and commercial gas-sales volume during the summer months, the line **must** make these low-cost industrial sales to keep its head above water.

If these industrial sales were wiped out as the coal industry wishes, Merriam declared, present field gas prices of about 12 cents an M.c.f. would be doubled. The pipeline would be able to take gas from producers except in very small quantities during summer months. Gas consumers would see a tremendous hike in their gas bills, and the clamor for federal gas controls would be terrific, Merriam said.

Disaster seen . . . Passage of the Staggers bill, he declared, would be much more disastrous to all segments of the natural-gas industry than was the U.S. Supreme Court's decision in the Phillips case.

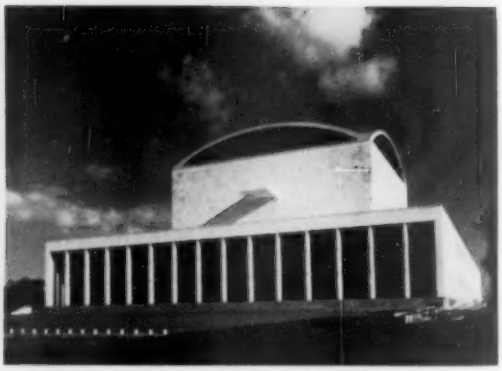
Merriam reported it is vital that this bill be defeated and that the Harris bill, supported by gas producers, be passed in some reasonable form which would free producers and satisfy consumers and utilities that gas prices will not soar out of sight.

The best and only way to do this, Merriam said, is to tell the consumer himself how the gas industry operates and why it cannot operate any other way.

It is highly important, too, Merriam said, that those engaged in the natural-gas business . . . from producers to utilities . . . do not forget that they are a part of the same industry. A threat to one segment of the industry is a threat to all segments.

OFFICERS ELECTED by the Natural Gasoline Association of America at its Dallas convention are, left to right, C. D. Gard, Union Oil Co. of California, Los Angeles, vice president; W. F. Matheny, Sid Richardson Gasoline Co., Fort Worth, vice president; H. W. Harts, Warren Petroleum Corp., Tulsa, vice president; George Tennison, Shell Oil Co., Houston, vice president; and A. H. Weil, United Gas Pipe Line Co., Shreveport, president. W. H. Lowe, Tulsa, reelected secretary-treasurer by the N.G.A.A. board, is not shown.

ROME'S UNIVERSAL EXHIBITION (E.U.R.) grounds will be one of the meeting places for the Fourth World Petroleum Congress.



PETROLEUM ACTIVITIES for 35 countries also will be presented in Rome's Congress Building (E.U.R.).

World Petroleum Congress Nears

Two hundred thirty-three papers will be presented during the 10-day session; two associated meetings also planned

ROME.—One of the world's most distinguished petroleum sessions—the World Petroleum Congress—is scheduled to open here June 6. This meeting, the fourth in the series, will continue through June 15.

There also will be an allied "International Exhibit of Oil Equipment" held simultaneously in Naples, on the premises of the Overseas Fair ("Mostra d'Oltremare"). The "Mostra d'Oltremare," formed of numerous buildings, theaters, reception rooms, and located in the natural setting of a large park, will display petroleum technical instruments and equipment.

Another associated activity will be a meeting of F.E.C.E.P. (Federation Europeenne des Constructeurs d'Equipement Petrolier). This assembly will take place on June 11 at the Congress Building, E.U.R., Rome.

Advance reports indicate the congress attendance may reach 4,000, including wives and guests of members. The published volumes of the technical proceedings of the congress later will be issued by Publisher Carlo Colombo, Via Campo Marzio 74, Rome.

The World Petroleum Congresses are aimed at examining and discussing subjects of new and advanced scientific, technical, and economic matter, directly or indirectly related to the oil industry. The Rome meetings will be held about 7 miles from the center of the city.

Application for attendance should be airmailed to the General Secretariat, Fourth World Petroleum Congress, Via Tevere 20, Rome. A large number of official receptions and plenary sessions are scheduled. One of the main purposes of the congress is to encourage personal contacts among the participants coming from all over the world, bound by common interests in petroleum engineering and development work and study.

Journal coverage . . . The Oil and Gas Journal will publish a special section on the Fourth World Petroleum Congress in its June 6 issue. This section will include recent developments in Italian oil and gas exploration, production, and petroleum refining and pipeline transportation.

Journal Editor Kenneth B. Barnes and Technical Editor Wilbur L. Nelson will attend the Congress. Both have attended previous congresses and presented technical papers. Barnes, while a petroleum engineering faculty member at Pennsylvania State University, was coauthor with G. H. Fancher and J. A. Lewis in a pioneering porosity-permeability paper at the First Congress in London, 1933. The Second Congress was held in Paris in 1937. Both Barnes and Nelson presented papers at the Third World Petroleum Congress at The Hague in 1951, as did also the Journal's refining editor, George H. Weber, and the Journal's Gulf Coast editor at the time, L. S. McCaslin, Jr.

During the 10-day conference, 233 technical papers will be presented. They include the following:

SECTION 1
GEOLOGY AND GEOPHYSICS

Regional Geology of Oil

America

"Petroleum Geological Characteristics of Venezuela," J. Dufour, M. V. De Bataafsche Petroleum, Mij., The Hague.

"Petroleum in Western Canada," J. F. Caley, Geological Surveys of Canada.

"Important Fractured Reservoirs in United States," M. K. Hubbert and D. G. Willis, Shell Oil Co., Houston.

"New Geological Studies Result in Discoveries of Large Reserves from Salt Dome Structures in Gulf Coast," M. T. Halbouty and G. C. Hardin, Jr., Houston.

"Geologic Map of Venezuela," A. S. Anglade, Ministerio di Minas e Hydrocarburos, Caracas.

Mediterranean Europe

"Les Resultats des Etudes pour la Recherche Petrolifere en Sicile," E. Beneo, Servizio Geologico Italiano.

"Oil Possibilities in Greece," G. Aronis and K. Zaxhos, Athens.

Middle Europe

"Wealden Formation in the Netherlands," G. C. L. Sung, N. V. Nederlandse A. Mij., Oldenzaal.

"Oil Accumulation and the Jurassic System in Northwest Germany," K. Hoffmann and W. Schott, Amt fur Bodenforschung, Hannover.

"Les Possibilites Petrolieres du Jurassique de l'Europe Moyenne, les Problemes Francais," E. Bonnard, B. Clavier, D. Trumpy, M. Mainguy, H. Hlauschek, R. M. Suronie-Vivien, M. Vigneaux, J. Cuvillier, P. Michel, V. Perebaskine, M. Gottis, M. Orgeval, M. Marie, and Y. Gubler.

"La Decouverte et les Premiers Developpements du Gisement de Parentis Dans le Sud-Ouest de la France," R. Navarre, Inst. Francais du Petrole, Paris.

Africa

"Recherches de Petrole en Afrique Noire Francaise," V. Hourcq, Soc. des Petroles d'Afrique Equatoriale Francaise.

"Rapport sur le Sahara."

"Geologie du Bassin du Cuanza en Angola," G. Brognon and G. Verrier, Comp. Financiere Belge des Petroles.

Asia

"Oligo-Miocene Marine Formation in Qum Region, Iran," M. A. Furrer and P. A. Soder, Kh. Takht-i-Jamshid, Teheran.

"New Aspects of Central Iran Geology," A. Gansser, National Iranian Oil Co.

Geology of Reservoirs

"Cementation of Oil Reservoir Sands (Great Britain)," C. A. Fothergill, Royal School of Mines, London.

"Location of Petroleum Accumulation by Facies Studies (U.S.A.)," L. L. Sloss, Northwestern University, Evanston.

Origin and Accumulation of Oil

"Contribution de la Geochimie a l'Etudes de l'Evolution des Huiles Brutes dans les Bassins Sedimentaires," F. Bienner, J. J. Burger, R. Gayral, R. Levy, M. Louis, R. Metrot, and C. Salle.

"Present Information on Origin and Accumulation of Oil," P. V. Smith, Esso Research & Engineering Co., Linden, N. J.

"Sand Facies of Recent Mississippi Delta Deposits," H. N. Fisk, Humble Oil & Refining Co., Houston.

"Interstitial Water of Oil-Bearing Sands and Sandstones," W. von Engelhardt, Gewerkschaft Elwerath, Erdoelwerke-Hannover.

Paleontology and Ecology

"Progress of Regional Sedimentology," D. J. Doeglas, Agricultural University, Wageningen.

"The Cretaceious-Eocene Boundary in Italy," M. B. Cita, Inst. di Geologia, Universita di Milano.

"Significant Advances and Trends in Paleontology and Ecology," M. A. Hanna, Gulf Oil Corp., Houston.

"Ratio Between Pelagic and Benthonic Foraminifera in Estimating Depth of Deposition of Sedimentary Rocks," T. F. Grimsdale and F.P.C.M. van Morkhoven, N. V. Bataafsche Petroleum, Mij., The Hague.

"Stratigraphic Correlation of Cretaceous in the Tethys and Boreal by Aid of Microfossils," F. Bettenstaedt and C. A. Wicher, Hannover.

"Etudes Micropaleontologiques de la Limite Cretacetertiaire dans les Mers Mesogeennes," J. Cuvillier, F. Dalbiez, C. Glintzboeckel, M. Lys, J. Magne, V. Perebaskine, and M. Rey.

Geophysics

"Apports des Methodes Electriques de Surface a la Prospection Petroliere," M. Migaux and Geza Kunetz, Compagnie Generale de Geophysique.

"Geophysical Prospecting Over Continental Shelves," Henry C. Cortes and R. N. Gsell, Magnolia Petroleum Co., Dallas.

"New Developments in Seismic Methods," Henry Salvatori, Western Geophysical Co., Los Angeles.

"Exploration for Reefs by Geophysical Methods," F. J. Agnich, Geophysical Services, Inc., Dallas.

"Modern Methods of Gravity and Magnetic Interpretation," Sigmund Hammer, Gulf Research & Development Co., Pittsburgh.

"Geophysical Technique Employed in Mexico During the Last 15 Years," Santos Figueroa H., Petroleos Mexicanos.

Correlation of Geological and Geophysical Studies

"Correlation of Geological and Geophysical Data," D. G. Skeels, Imperial Oil Ltd., Edmonton.

"Comparative Geological and Geophysical Study of the Po Basin," Rocco, AGIP Mineraria, Milan.

"Development in Geophysical and Geological Exploration in Germany," Alfred Bentz and Hans Closs, Amt fur Bodenforschung, Hannover.

"Reflection-Seismic Exploration of Schleswig-Holstein Germany and Geological Interpretation by Well Data," F. Hecht, DEA, Hamburg; H. v. Helms, PRAKLA, Hannover; and W. Kehrer, WIAG, Celle.

SECTION 2
DRILLING AND PRODUCTION

Drilling Fluids

"Unstable Behavior of Shale Formations in Boreholes and Control by Properly Adjusted Mudflush Quality," J. H. M. A. Thomeer, N. C. de Bataafsche, Petroleum Mij., The Hague.

"Flow Characteristics of Oil Base Drilling Fluid," H. D. N. Fitzpatrick, Trinidad Leaseholds, Ltd.

"Symposium Sur Les Boues de Forage," G. Ricard, C. Sourisse, J. Nougaro, J. Feger, M. Labouysse, and A. Thomas.

"High Weight Muds in Drilling Abnormally High Pressure Formations," P. W. Cooke, British Petroleum Co., Ltd.

Well Completion

"Modern Well Completion Methods in U.S.A.," A. L. Solliday, Stanolind Oil & Gas Co., Tulsa.

"Oilwell Gravel Packing Operations in Trinidad," A. S. Curlet and R. Pike, Trinidad Leaseholds, Ltd.

Drilling Techniques

"New Drilling Developments," W. B. Brooks, L. W. Randerson, and F. W. Shall, Magnolia Petroleum Co., Dallas.

"Techniques of Drilling and Producing High Drift Angle Directional Wells," D. S. Johnston, Signal Oil & Gas Co., and J. T. Carried, Southwest Exploration Co.

"Average Reservoir Pressure," D. R. Horner, Shell Oil Co. of Colombia, Bogota.

Bore-Hole Surveys

"Symposium on Well Bore Surveys," J. E. Walstrom, Standard Oil Co. of California.

"Pour Une Theorie Generale de l'Eltranslog," A. Belluigi, Instituto di Geofisica Mineraria.

"Une Nouvelle Methode Pour Prelever des Echantillons de Fluides dans les Formations," J. Delacour, Soc. de Prospection Electrique, Procedes Schlumberger, Paris.

Primary Production

"Recovery Increase by Thermal Drive," J. van Heiningen and N. Schwarz, Koninklijke, Shell-Laboratorium, Amsterdam.

"Study on P. V. T. Relations of Reservoir Fluids," W. R. van Wijk, D. A. de Vries, and H. A. C. Thijssen, Agricultural University, Wageningen.

"Recent Application of Reservoir Treatment in Venezuela," J. W. Butler, Phillips Petroleum Co.; D. G. F. Bailey, Caracas Petroleum; J. W. Billard, Texas Petroleum; C. Dobbel, Pantepec Oil; B. N. Moore, Sinclair; A. F. Pocock, Richmond Exploration; R. L. Slaton, Venezuelan Atlantic; and R. J. Tribbey, Socony-Vacuum.

"Pipeline Flow of Oil and Gas Mixtures," P. B. Baxendell, Royal Dutch-Shell Group, The Hague.

"Heavy Oil Production in California," J. J. McCullough, Union Oil Co. of California.

"Degazolinage et Deshydratation par le Froid du Gaz Naturel," J. Aymon and A. Narbonne, Regie Autonome des Petroles.

"Flow in Fissured Formations," W. J. Baker, British Petroleum Co., Ltd.

"Effect of Production Restriction on Iranian Oil Reservoir," W. J. Graham, The Texas Co.; G. Heatherington, Gulf Oil; R. E. Old, Jr., Socony-Vacuum; and V. Tuman, Iranian Oil Exploration and Producing Co.

Secondary Production

"Correlation of Ultimate Oil Recovery with Reservoir Characteristics (U.S.A.)," Stuart E. Buckley, Humble Oil & Refining Co., Houston.

"Investigation into the Theoretical Recovery of Oil from Fissured Limestone Formations by Water-Drive and Gas-Cap Drive," J. Birks, British Petroleum Co., Ltd.

Material Problems

"Masses and Moments of Inertia of Moving Parts of a Drilling Installation on Its Hoisting Performance," H. M. Hohmann, Royal Dutch-Shell Laboratories, The Hague, and B. E. Buskin, N. V. Nederlandse Aardolie Mij., Oldenzaal.

"Foundation Problems for Marine Drilling Platforms," A. Kranendonk, Royal Dutch-Shell Group, The Hague.

"Corrosion Effects of Hydrogen Sulfide and Carbon Dioxide in Oil Production," Walter F. Rogers, and J. A. Rowe, Jr., Gulf Oil Corp., Houston.

"Lightweight Steel Construction for Oil Drilling and Production Equipment," George Bierett and Erick Bahke, Salzgitter Maschinen A. G., West Germany.

"Design of Combined Casing Columns," J. Hefferan and F. Inguanzo, PEMEX, Mexico City.

"Etude de Comportement Volumetrique et des Conditions de Formation d'Hydrates d'Un Gaz Natural Contenant Une Forte Proportion d'Hydrogene Sulfure," R. Molinero, and R. Fagegaltier, Inst. Francais do Petrole, Rueil-Malmaison.

Terminology of Petroleum Reservoirs

"Terminology of Petroleum Reserves," F. H. Lahee, Sun Oil Co., Dallas.

SECTION 3
OIL PROCESSING

General Problems

"White Oil Manufacture (Great Britain)," V. Biske and A. Cluer, Lobitos Oilfields, Ltd.

"La Reconstruction des Raffineries de Bari et de Livourne (Italie)," U. Galati, S.T.A. N.I.C.—Industria Petrolifera.

Physical Operations in Oil Processing

"La Cristallisation Extractive par l'Uree dans les Operations de Raffinage du Petrole," A. Champagnat, J. Laugier, Y. Rollin and C. Vernet, Soc. Francaise des Petroles BP.

"Recent Developments in Fractional Distillation," A. P. Colburn and J. A. Gerster, University of Delaware, and Cyrus Pyle, E. I. du Pont de Nemours & Co., Wilmington.

"Fundamentals of Mixing in Petroleum Refining," J. H. Rushton, Illinois Institute of Technology, Chicago.

"Etude du Transfert de Chaleur Par Rayonnement dans les Fours," M. Delpech, Esso Standard Francaise des Petroles, and G. Monnot, Inst. Francais du Petrole.

"Pressure on Filtering Rate in Dewaxing," A. F. Orlicek, Technical University, Vienna.

"Pilot Plant Employing a Novel Process

GENERAL ASSEMBLY LECTURES—FOURTH WORLD PETROLEUM CONGRESS

June 8. "The Evolution of Oil Exploration," by P. T. Cox, chief geologist, British Petroleum Co., Ltd.

June 10. "Fundamental Research in the Design of Petrochemical Equipment," by Prof. J. C. Jungers, professor of chemical thermodynamics and kinetics, French Institute of Petroleum.

June 13. "Energy Resources," by Prof. W. K. Lewis, department of chemical engineering, Massachusetts Institute of Technology.

June 14. "Development of Natural-Gas Industry in Italy," by Ing. E. Mattei, chairman of Ente Nazionale Idrocarburi, Rome.

for Urea Extraction of Hydrocarbons," L. N. Goldsbrough, Shell Petroleum Co., Ltd.

"Urea Reaction for Dewaxing of Washed Blue Oil from Indian Crude Oil," K. V. Copalan, Assam Oil Co., Ltd., Digoi.

"Continuous Percolation of Lubricating Oils," A. O. Pukkila, H. W. Shea, Socony-Vacuum, Paulsboro, N. J.; J. W. Bartholomew, Vacuum Oil Co., Ltd., Coryton, England, and R. B. Killingsworth, Vacuum Oil Co., Ltd., London.

Desulfurization

"Nouveau Procede de Raffinage," A. Gislon and J. M. Quiquerez, Compagnie Francaise de Raffinage.

"Autofining Process—The Production of Low Sulfur Diesel Oils," J. W. Hyde and F. W. B. Porter, British Petroleum, Research Station, Sunbury-on-Thames, Middlesex.

"Theoretical and Technological Research on Desulfurization of Light-Petroleum Distillates," C. Padovani, V. Berti, A. Girelli, and A. M. Ilardi, Stazione Sperimentale Combustibili, Politecnico de Milano.

Catalytic Reforming

"Fluid Hydroforming," C. W. Tyson, Esso Research & Engineering Co., Linden.

"Platforming, Present and Future," V. Haensel and J. F. Walter, Universal Oil Products Co., Des Plaines, Ill.

"Chemical Conversion by Isomerization and Dehydrogenation Catforming," M. J. Fowle, R. D. Bent, and B. E. Milner, Atlantic Refining Co., Philadelphia.

"Regenerative Platinum-Catalyst Reforming of Naphthas," J. K. Roberts, E. W. Thiele, and R. V. Shankland, Standard Oil Co. (Indiana).

Catalytic Cracking

"Deactivating Agencies on Performance of Silica-Alumina Cracking Catalyst," N. J. H. Small, P. H. S. Kirkaldy, and A. Newton, Trinidad Leaseholds, Ltd.

"Today's Houdriflow Catalytic Cracking Process," H. D. Noll, J. C. Dart, and R. E. Bland, Houdry Process Corp., Philadelphia.

"Advances in Fluid Catalytic Cracking," E. J. Gohr, Esso Research & Engineering Co.

"Recent Developments in TCC Cracking," E. V. Bergstrom, V. O. Bowles, L. P. Evans, and J. W. Payne, Socony-Vacuum Laboratories, New York.

"Catalytic Processes and Italian Refineries," G. De Sanctis, A. Messenio, and F. G. Piscia, CONDOR S.p.A.

"Improvement of Activity and Selectivity of Solid Catalysts," E. W. Nagelstein, Paris & Marxzell, Kreis Karlsruhe.

"Application of Combination Processing," J. A. Beukers and H. P. Kelder, Esso Standard Refinery, Antwerp.

Thermal Conversion of Heavy Residuums

"Fluid Coking of Residue," A. Voorhies, Jr., Esso Standard Oil Co., Baton Rouge.

"The Hoechst Continuous Coking Process," H. Krekeler, Ffm, Hoechst.

Chemical Operations in Oil Processing

"Gasoline Treating Processes With Special Regard to Sulfur Problems," J. W. le Nobel, Koninklijke/Shell Laboratories, Amsterdam.

"Fundamentals of Bitumen Blowing," M. J. Goppel and J. Knotnerus, Koninklijke/Shell Laboratories, Amsterdam.

"Dehydrogenation Reaction of Hydrocarbons and Hydrogen in Aromatization," K. Peters, Austria.

Symposium on Shale Oil

Four papers: U. S.-Colo., Sweden, Spain, Israel.

Atmosphere and Water Pollution By Petroleum Products

"Dosage des Produits Chimiques dans les Effluents de Raffinerie," D. Giraud-Desjuzeur and A. Van Langermeersch, Esso Standard Francaise, Port-Jerome.

"Atmospheric Pollution Problems Associated with Refining of Middle East Crudes," A. W. W. Kirby, Shell Refining & Marketing Co., London.

"Air Pollution Problems and Control," I. McCallum, P. G. Layzell, and R. A. Vere, Esso Petroleum Co., Ltd., Fawley.

"On Deodorization of Refinery Effluents," I. McCallum, J. A. Shaw, C.H.S. Gill, and H. Peters, Esso Petroleum Co., Ltd., Fawley.

Hydrogenation

"Petroleum Refining with Hydrogen," W. E. Bradley, G. W. Hendricks, and H. C. Huffman, Union Oil Co. of California, Brea.

"Hydrogenation of Crude Oils in Germany, Combined with Cracking," M. Pier, Ammonia Laboratories, Badische Anilin & Soda—Fabrik AG., Ludwigshafen a. Rhein.

SECTION 4

CHEMICALS FROM PETROLEUM

Production and Utilization of Olefins

"Advances in Tetramer, Cumene, and Motor Polymer Manufacture," Gustav Egloff and E. K. Jones, Universal Oil Products Co., Des Plaines, Ill.

"Routes to Ethylene Manufacture," J. W. Woolcock, Imperial Chemical Industries, Ltd., Billingham.

"Gazeification Catalytique des Fuels Lourds en Vue de l'Obtention d'Ethylene et de Propylene," M. Patry, E. Luzzareta, and C. Paul, Office National Industriel Azote, Toulouse.

"Les Reactions des Olefines—Principes Directeurs dans l'Organisation de la Recherche," G. E. Limido, Inst. Francais du Petrole.

Oxidation of Hydrocarbons

"Recovery and Oxidation of Isomeric Xylenes," W. G. Toland and E. L. Nimer, California Research Corp., Richmond, Calif.

"Chemicals by Direct Oxidation of Hydrocarbons," E. T. Powers, Celanese Corp., New York.

"Acetylene by Partial Oxidation of Methane," E. Bartholome, Fabrik AG., Ludwigshafen am Rhein.

"Les Procedes de Synthese par Oxydation des Hydrocarbures—Systematique des Reactions," J. C. Balaceanu, Inst. Francais du Petrole.

"Recherces et Experiences sur l'Oxydation Partielle du Methane par l'Oxygene, sur Catalyseurs," C. Padovani, G. Salvi, and A. Fiumara, Politecnico di Milano.

"Thermodynamique et Toechiometrie de l'Oxydation Partielle du Methane par l'Oxygene Libre," G. Salvi and A. Fiumara, Politecnico de Milano.

"L'Oxo-Synthese; Quelques Methodes de Traitement du Produit Brut de Synthese," Ibrahim Dakli, Novara, Italy.

Various Developments

"Surface Active Agents from Petroleum, Properties and Uses," J. C. Sanford, Chemical Materials Pty., Ltd., Sydney.

"Chemicals from Acrolein," S. A. Ballard, H. de V. Finch, B. P. Geyer, G. W. Hearne, C. W. Smith, and R. R. Whetstone, Shell Development Co., Emeryville, Calif.

"Canadian Petrochemical Industry," A. W. Hutchinson and R. G. Stevens, Shell Oil Co. of Canada, Toronto.

"Polyethylene," R. E. Burk and D. E. Strain, E. I. du Pont de Nemours & Co., Wilmington, Del.

"Manufacture of Acrylonitrile from Natural Gas," J. T. Thurston, E. L. Carpenter, and F. Derbenwick, American Cyanamid Co., Stamford, Conn.

"Free Radical Reactions in Hydrocarbon Chemistry," E. C. Kooyman, Koninklijke/Shell Laboratories, Amsterdam.

"Manufacture of Chemicals from Lubricating Oil Byproducts," F. E. Hixon, Shell Refinery & Marketing Co.

"Chemicals from Petroleum in U.S.A.," J. P. Cunningham, Shell Chemical Corp., New York.

"New Developments in Hydrocarbon Synthesis," H. Kolbel, P. Ackermann, and F. Engelhardt.

"Friedel Crafts Syntheses with Aliphatic and Hydroaromatic Hydrocarbons," H. Hopff, E. Baserga, R. Roggero, and H. Bosshard, Swiss Federal Institute, Zurich.

"Petrochemical Industry in Italy," G. Ballabio, Soc. Montecatini, Milan.

"Deshydrogenation des Alcools Secondaires en Phase Liquide les Elements du Calcul Rationel d'un Reacteur Industriel," F. Coussemant, Inst. Francais du Petrole.

"Recent Developments in Chemistry of Olefins," G. Natta, Politecnico di Milano.

"Modern Methods of the Chemistry of Acetylene and Olefins," W. Reppe, Ludwigshafen.

SECTION 5

COMPOSITION OF PETROLEUM: ANALYSIS AND TESTING, MEASUREMENT AND CONTROL

Petroleum Composition and Properties

Twelve papers.

Sampling and Analysis

Five papers.

Apparatus and Methods of Instrumental Analysis

Six papers.

Correlation Between Physico-Chemical Properties and Composition of Petroleum Products

"Ultrasonic Velocity, Related With Other Physical Properties in the Structural Group Analysis of Petroleum Products," M. Baccaredda, Universita di Pisa.

Analysis of Impurities and Trace Constituents

Five papers.

SECTION 6

UTILIZATION OF PETROLEUM PRODUCTS

Asphalts and Bitumens

Three papers.

Waxes and Paraffins

Two papers.

Lubricants

Seven papers.

Heavy Fuels

"Prevention of Oil Ash Deposition by Means of Fuel Additive," P. T. Sulzer, Sulzer Brothers, Ltd., Winterthur, Switzerland.

"Deposits from Continuous Combustion of Oil Fuels," A. Lewis, Shell Petroleum Co., Ltd., Chester, England.

"Experience in Service With Gas Turbines Using Heavy Fuel Oil, and Application of Gas Turbines in the Petroleum Industry," Hans Pfenninger, Brown Bovery & Cie., Baden, Switzerland.

"Use of Residual Fuels in Gas Turbines," E. B. Evans, D. M. McLean, F. R. Sharp, and A. Winward, Esso Development Co., Ltd., Abingdon, Berkshire.

Fuels and Combustion in Diesel Engines

Four papers.

Fuels and Combustion in Spark Ignited Engines

Six papers.

Uses of Petroleum Products in Gas Industry

Seven papers.

SECTION 7
CONSTRUCTION OF EQUIPMENT, MATERIALS, CORROSION

Petroleum Refinery Engineering
Three papers.

Construction Materials
Eight papers.

Corrosion and Protection of Equipment
Six papers.

SECTION 8
TRANSPORT, STORAGE, AND DISTRIBUTION

Storage and Transportation

"Loss Control in Transportation and Storage of Petroleum and Petroleum Products," J. H. McClintock, Esso Standard Oil Co., New York.

"L'Economie des Super-Petroliers," R. Gasquet, Compagnie Navale des Petroles and H. Deschenes, Port Autonome du Havre.

"Recent Developments in Oil-Tanker Equipment," J. Lamb and J. W. Strang, Anglo Saxon Petroleum Co., London.

Pipelines and Terminals

"Design and Operation of Marketing Terminals," C. R. McMillin, Standard Oil Co. of California, San Francisco.

"Economics and Technological Considerations in Recent Canadian Pipeline Developments," F. F. Fairlie and F. C. Lantz, Imperial Oil, Ltd., Montreal.

"Design and Construction of Underwater Pipelines," J. E. Green, Shell Pipe Line Corp., Cushing, Okla., and H. H. List, Shell Pipe Line Corp., Houston.

"Pipelines for Viscous Fuels," P. E. Ford, British Petroleum Co., Ltd.

"Principes Contructifs des Conduites pour le Transport des Hydrocarbures Liquides et Gazeux en Italie," E. Donati and U. Biffignandi, Dalmine S.p.A., Milan.

"Safety in Natural Gas Transmission and Distribution," F. Salimbeni, Soc. Nazionale Metanodotti, Milan.

SECTION 9
ECONOMICS, STATISTICS, AND EDUCATION

Training and Management

"Effective Statistical Analyses for Management," R. J. Gonzales, Humble Oil & Refining Co., Houston.

"Education for Management in Petroleum Industry," W. B. Maloney, Standard Oil Co. (N. J.).

"The Independent Consultant and the Use of Petroleum Products," A. L. Temby and H. A. Ruffel, Defence Standards Laboratories, Maribyrnong, Victoria.

Technical Aspects of Economical Problems

"Oil and Gas Conservation in Venezuela," Jose Martorano Battisti, Co. Shell de Venezuela; Siro Vasquez M., Creole Petroleum Corp.; and Luis Herrera, Mene Grande Oil Co., Caracas, Venezuela.

"Interdependence as Foundation for World Oil Operations," W. J. Levy, New York.

"Role of Fuel Oils in Europe," P. H. Frankel, England.

"Limitations of Right of Property Owners to the Laying of Methane Piping," Saverio Ilardi, Ente Nazionale Idrocarburi, Rome.

"Utilization of Petroleum Fuels in Europe," W. M. Holaday and R. E. Albright, Socony-Vacuum Oil Co., New York.

"Trends in Energy Consumption in Italy," D. Liotta and F. Bertoline, Esso Standard Italian, Genoa, and G. Verzi, and S. Gatti, Soc. Edison, Milan.

"La Place du Petrole et du Gaz Naturel dans l'Economie Energetique des Pays Membres de l'O.E.C.E.," J. A. van den Heuvel, O.E.C.E.

L.P.G. Comer as Motor Fuel

Butane-propane proving ideal in modern spark-ignition, high-compression engines; it's cleaner, more powerful

DALLAS.—Look for a big increase in use of L.P.G. as motor fuel. It is the ideal fuel for spark-ignition engines. And modern high-compression engines operate better on this fuel than those with lower compression ratios.

E. F. Jernigan, Warren Petroleum Corp., Tulsa, outlined these ideas at the recent annual N.G.A.A. meeting here. He presented a paper written by D. E. Welch, also of Warren.

The burning characteristics of L.P.G. are such that the fuel operates more efficiently in high-compression engines, Jernigan said. The average ratios now being used by car makers are just inside the range where L.P.G. can be used efficiently. And satisfactory operation can be obtained up to compression ratios of about 12 to 1. This means that average ratios can be increased 25 to 30 per cent above those in 1955 cars before L.P.G. fuel gives trouble.

High-octane fuel . . . Average research octane for L.P.G. is about 100 clear. This meets fuel requirements for all passenger cars on the road or currently in the design stage. No additives of any kind are required, and engine deposits are greatly reduced. L.P.G. is clean-burning fuel under all engine conditions. Engine maintenance is cut to the bone.

The L.P.G. engine bests gasoline and diesel engines, based on the two main yardsticks by which engines are rated. It produces more horsepower per pound of engine weight, and requires less volumetric displacement per horsepower.

Makers of tractors, buses, and trucks now produce models with L.P.G. engines. Some cars have been converted, either to a dual fuel system or exclusively to L.P.G. Extent of current usage is shown by the consumption of 625 million gallons as motor fuel in 1954. This amounts to 12 per cent of total L.P.G. sales for that year.

Future outlook . . . Diesel engines have about reached the peak of efficiency, and gas turbines for motor vehicles are several years in the future, Jernigan said. This means, then, that spark-ignition engines will power the bulk of cars for a number of years.

As octane requirements increase with compression ratios, the refiner is hard pressed to produce satisfactory gasoline. This will become even harder as octane requirements continue to increase. L.P.G. can help solve this problem. In certain areas of the country, it can be supplied plentifully, in convenient outlets, and at very moderate cost.

Settlement Sought

Sinclair and union may work out new contract

DENVER.—The C.I.O. Oil, Chemical and Atomic Workers International Union and Sinclair Oil Corp. are trying to arrange negotiations to iron out a dispute which led to O.C.A.W. termination of the contract covering Sinclair employes.

The union announced termination of the contract 2 weeks ago following a breakdown in negotiations.

The contract, largest in the industry and the only one on a national basis, actually expired last July 31. It was continued on a day-to-day basis during negotiations and until notice of termination.

B. J. Schafer, O.C.A.W. vice president and coordinator of the Sinclair council, informed company officials in New York by letter that the union is seeking improvement in grievance procedure and further limitation of contracting work to ousiders.

Sinclair and O.C.A.W. previously had agreed to a 10-cent an hour across-the-board wage increase and to improvements in the sick benefits plan and the group life insurance program, but the union hold-out on the two other items blocked final settlement.

A strike called against Sinclair by O.C.A.W. would affect directly 10,000 production and pipeline workers and all refinery operations except those at Wood River, Ill., where an A. F. of L. contract is in force. The union claimed approximately 25,000 additional Sinclair workers would be affected indirectly.

However, the termination action involves a 60-day waiting period, and union officials expressed confidence that settlement could be reached in that time.

Schafer also informed Sinclair officials of a union desire to reopen negotiations on the pension agreement. This is a separate contract, subject to negotiation every 5 years. It was first signed in the spring of 1950, and this is the union's first opportunity to ask for renegotiation.

Dead Bill Revived

Oklahoma House passes 25-bbl. allowable plan

OKLAHOMA CITY.—The once-killed mandatory minimum allowable bill suddenly came to life in the Oklahoma Legislature last week.

The house, which earlier had defeated the measure proposing a 25-bbl. daily minimum production for Oklahoma oil wells, reconsidered the bill and under the urgings of Gov. Raymond Gary surprisingly passed it. It took Gary's forces in the house 2 hours and five roll calls to accomplish the job.

The controversial bill would place the 25-bbl. allowable on a lease basis, thus allowing some wells on a given lease to produce more than the minimum if others fall below. Shallow producers have supported the proposal which has been opposed by companies holding deeper production.

The bill precipitated a fight when it reached the senate. One of its advocates attempted to bypass committee consideration by placing the measure directly on the calendar. Senators voted this move down and sent the bill to a committee which earlier had killed a similar senate proposal.

On another front last week, oil industry spokesmen attended a public house hearing here to oppose the "common purchaser" bill which would compel pipeline firms to extend their facilities to new nearby fields and buy crude without discrimination. Industry witnesses declared pipelines cannot be forced to buy oil when it is not economically feasible. They added if such a law is passed purchasers will go outside Oklahoma for crude.

The house last week passed and sent to the senate a bill forcing oil companies to sell natural gas to farmers for irrigation purposes. A house member also introduced the long-expected tax on natural gas. The levy was proposed at 3 cents per 1,000 cu. ft. with revenue going to various school activities.

Texas Natural Expands

TULSA. — Texas Natural Gasoline Corp. has acquired controlling interest in Ellis Transport Corp., Houston, from W. G. Ellis.

Ellis Transport is a wholesale distributor of L.P.G. in the Houston area. It has a 20,000,000-gal. storage facility in Pierce Junction salt dome, just southeast of Houston.

Texas Natural has a daily production of 550,000 gal. of gas liquids, owns a fleet of tank cars, and has underground storage of 55,000,000 gal. The company and its subsidiaries own seven gasoline plants in Texas. An eighth is under construction.

Work Begins on Pilot Plant

LOS ANGELES.—Work has started on a pilot coking plant and miniature high-pressure Unifier at Union Oil Co.'s Brea, Calif., research center. The installations are included in the company's $5,000,000 program to evaluate its shale deposits near Rifle, Colo.

Union is moving rapidly ahead with its shale research program, Reese H. Taylor, Union president, told the company's shareholders at their annual meeting here.

During the next 2 years a 1,000-ton per day retort will be built near Rifle. The company owns 50,000 acres of shale containing an estimated 5 billion barrels of shale oil in the Rifle area.

Another phase of the evaluation project is to develop detailed designs for a full-scale shale-oil plant. On completion of the work the company will have an accurate estimate of the potentil profit in mining its shale oil, Taylor pointed out.

Spencer Charts Expansion

VICKSBURG, Miss.—A $1,500,000 expansion in nitric acid and ammoniating solutions facilities will be undertaken at the Spencer Chemical Co. plant here. The project will be completed early in 1956.

The company reported markets of the southeastern United States can be best served by expanding the Vicksburg facilities for processing ammonia into solutions. These solutions are used by manufacturers of mixed fertilizers as a source of nitrogen.

The Vicksburg expansion will complement construction of nitric acid and Spensol facilities now under way at the company's Henderson, Ky., ammonia works, expected to be completed by July.

Houston Firms Merge

HOUSTON. — Petroleum Management Co. and Livingston Drilling & Well Service, Inc., both of Houston, will merge and become Union of Texas Oil Co.

The two firms are controlled by Russel Casey, Jr., C. Von Eiff, and L. L. Seiffert, Jr., all of whom left Woodley Petroleum Co. in 1950 to form the two companies.

Casey said last week the two firms have discovered seven new oil fields and own reserves of 1,319,000 bbl. of oil, principally in the lower coastal counties of Texas.

Industry Briefs

WASHINGTON.—The Oil and Gas Division of the Interior Department is now the Office of Oil and Gas. The change, ordered by Secretary Douglas McKay early this month, is in line with the effort to standardize titles in the department. There will be no change in personnel or work.

NEW YORK. — Union Sulphur & Oil Corp. is now officially Union Oil & Gas Corp. of Louisiana. Stockholders approved the name change recommended by company management last week. The firm no longer operates sulfur properties, but is principally engaged in exploration and production of oil and natural gas. Its most important producing properties are in Louisiana, but it also carries on exploration elsewhere.

DENVER.—The Colorado Oil and Gas Conservation Commission has ordered 40-acre drilling and spacing patterns in three fields in Logan County. The orders, issued last week, cover oil and gas wells drilled to the D and J sands of the Minto-West field, the D sand of the Northwest-Graylin field and the J sand of the Dale-North field.

WASHINGTON.—The Asphalt Institute will dedicate its new laboratory and office building on the University of Maryland campus, College Park, Md., May 5. The institute was organized 30 years ago and moved to Maryland last January for a greatly expanded research and development program in association with the university's engineering school.

DENVER. — The Crusader Oil & Uranium Corp. has been formed by a merger of Niobrara Oil, Inc., Crusader Corp., and Empire Oil Corp. The new firm is incorporated at $1.5 million and controls oil and gas leases and uranium holdings of the three other companies in Colorado, Wyoming, Utah, and New Mexico.

MIDLAND, Tex.—Shell Oil Co. reportedly has paid $1,000,000 for a half interest in oil leases on 10,000 acres in the west-central part of Upton County, West Texas. The purchase was made from J. H. Tippett and others. The group is to receive $100 an acre plus a three-sixteenth royalty from any production developed. The lease spread is east and a little south of Amacker-Tippett field and of a new discovery by Humble Oil & Refining Co. and Hunt Oil Co.

Smog Progress Cited

Scientists making headway in finding out what it is and how it's formed; studies show human activity responsible

D. H. Stormont

PASADENA, Calif.—Progress in combating Los Angeles' chronic smog problem was a highlight on the national air-pollution symposium held here April 18-20.

Studies discussed included those of engine exhaust gases as well as the atmosphere of the Los Angeles Basin.

Just how smog is formed and what the principal pollutants are, are not yet fully understood. Detailed systematic studies of significant compounds, using automatic analyzer-recorder instruments, are helping to find a solution, however.

What was found . . . Tentative conclusions from a recent 4-month study were outlined by L. B. Hitchcock, president of the Air Pollution Foundation, which sponsored the survey. These did not point particularly to oil refineries as a major source of smog-forming materials, although the speaker carefully avoided saying so.

Observations at the 10 stations scattered throughout the basin showed that oxidant concentrations—a measure of smog intensity—reached a maximum at all stations at about midday. They began to increase all over the basin at about the same time of day, suggesting that the material from which the oxidant was formed was widely distributed.

The oxidant values, which go hand in hand with eye irritation, showed a consistent increase along the streams of air from the Pacific Ocean to the foothills. Plotting of average maximum daily values yielded "contour" maps.

He stressed that the findings are tentative, but the hypothesis during the survey was consistent: that there is (1) a good relationship between oxidants rising and eye irritation increasing; (2) that eye-irritating substances, just as all pollutants, increase in concentration as they travel over the source areas. He identified these areas as regions of heavy population and industry.

Thus as air starts from the beach front and follows a path from Venice to Wilshire to Burbank, or from south of Venice to the central business district and on to Pasadena, or from Dominguez toward Azusa—in each case there is a corresponding boost in the oxidant concentration and eye irritation property.

Caused by people . . . Since the peak of smog formation shifted 1 hour when the West Coast shifted from daylight to standard time, it suggests the pollutants which give rise to oxidant formation originate from human activity, he declared.

Of the new instruments developed, the oxidant recorder of Stanford Research Institute is of interest. It provides for the analysis of irradiated air to give a measure of prevursors (parent substances) in the atmosphere.

A continuous hydrocarbon analyzer and another for olefins are being developed. Machines for determining and recording concentrations of nitric acid, nitrogen dioxide, carbon monoxide, and of ozone itself also are in use.

Cars being studied . . . Work being carried on by the automotive industry, in the field of exhaust gas studies, was described by J. C. Zeder, vice president of Chrysler Corp. Of particular interest was the phase devoted to developing a means of hydrocarbon reduction.

Five companies have in various stages of development one or more devices to limit manifold vacuum or to reduce fuel flow during deceleration, he reported. One company is concentrating on a fuel injection device to improve combustion, and several others are working on this approach, he stated. Afterburners have been explored by at least two companies, and two are working on a catalytic muffler.

Practical value of any of these devices is not yet proved, he pointed out. One such device, used by Zeder as an example, gives promise of reducing hydrocarbons in exhaust fumes by as much as 90 per cent during deceleration—the period when small amounts of unburned fuel are most likely to be present. Much more testing is needed, though.

Conservation Bill Passed

SACRAMENTO.—A voluntary oil conservation program for California is provided in a measure passed by the state assembly after one of the hottest fights of the current session. The bill will be sent to the governor's desk after the senate approves amendments imposed by the lower house.

The bill gives legal status to voluntary oil conservation methods, such as are now being carried out under the conservation committee of California oil producers. It states that the committee's recommendations of maximum efficiency rates are in the interest of oil conservation and declares it is lawful for the committee to issue such recommendations and for producers to comply with them.

Gas Imports Flayed

California producers hurt by out-of-state supplies

LOS ANGELES.—Large volumes of natural gas being imported into California are displacing residual oils and causing an oversupply of the fuel oil.

R. A. Grant, retiring president of Oil Producers Agency, recommended at the group's annual meeting that a thorough study be made of the effect of out-of-state gas and particularly of possibilities of further developments in underground storage.

Grant declared that some 1.4 billion cubic feet of gas comes into the state daily. Public utilities sell it during warm months of low demand to industrial users and steam electric plants. This absorbs a market which otherwise would be supplied by fuel oil.

Moreover, the California producer of gas is having to sell his product at a lower price than that paid for out-of-state gas delivered at the California border, Grant said. He added that out-of-state gas delivered under contract is no more valuable than gas produced in the state.

The oil spokesman explained that underground storage might be the answer to shoring up the whole economy of the California oil industry. He said sufficient underground gas storage would provide a place for surplus gas produced in the summer for use in winter peak demand seasons. He declared utility companies would need less additional out-of-state gas at increasing costs to the domestic consumer and there would be less interference with the fuel-oil market.

R. R. Von Hagen, president of Lloyd Corp., was elected president of the association, succeeding Grant. Other officers elected were F. W. Borden, Sunray Oil Corp., vice president; H. D. Campbell and W. H. Geis, reelected vice presidents; Stark Fox, reelected executive vice president; S. E. Cavanaugh, secretary-treasurer; and Verne Harrell, assistant secretary-treasurer.

Leasing Validated

Action may clear way for Montana lease sales

HELENA, Mont. — Indefinite-term leasing of state-owned lands for oil and gas exploration in Montana was validated last week by Judge Victor H. Fall in District Court here.

He signed an order reinstating his original decision which held the 1953 indefinite-term lease law constitutional.

The case was remanded to the Helena court a day earlier by the Montana Supreme Court. The upper tribunal had ruled earlier that the leasing law violated the Enabling Act under which the state was admitted to the Union in 1889.

The U. S. Supreme Court, ruling on an appeal, decided the statute did not violate federal law and ordered a change in the state court's decision *(The Oil and Gas Journal, March 21, page 129)*. Last week's court action may clear the way for granting of new leases on state lands.

The State Supreme Court last week dismissed petitions by Atty Gen. Arnold H. Olsen asking for a modified opinion, and by Ford Johnson, intervenor in the original court action, asking that the federal court order become effective immediately.

Another dispute? . . . The Montana Land Board, meanwhile, indicated a new dispute may be in the making. It denied a request by Lawrence Barker, Jr., Billings independent oil operator, for a public oil and gas lease auction of state lands under terms of the 1953 law.

Olsen, a member of the board, said the agency would enter into leases for a maximum of 20 years, the term prevailing before the 1953 law was enacted.

The board also denied requests of 20 oil companies for extension of time in which to commence drilling on state lands. The board said it would grant extensions only if the companies paid the $2 per acre nondrilling penalty.

Railroad Enters Pipelining

ST. PAUL.—Northern Pacific Railway Co. is entering the pipeline business through purchase of a 10 per cent interest in the proposed Butte Pipe Line, a crude carrier which will extend from eastern Montana to Wyoming.

The $19,000,000 line is scheduled to be completed early next fall. It will extend from Poplar field near Wolf Point, Mont., to the Guernsey-Fort Laramie area in Wyoming. The system will provide an outlet for eastern Montana crude through one or more of the major crude lines extending to the Chicago area.

Other companies with an interest in the line are Shell Oil Co., Murphy Corp., and Placid Oil Co. A 35-mile gathering system already in operation from the Pine and Cabin Creek fields will become a part of the Butte line.

Northern Pacific Railway has oil rights on about 3,000,000 acres in the Williston basin. Robert S. Macfarlane, president, said the railroad has crude production of about 1,000 bbl. a day from royalty or working interest in 62 Williston basin wells.

Frontier Expanding Refinery

CHEYENNE, Wyo. — Procon, Inc., will build a 2,500-bbl. Platformer and a 3,000-bbl. Unifiner at Frontier Refining Co.'s refinery here. Installation will start May 1.

The project is part of a $1,500,000 refinery expansion program which also calls for increasing the plant's charging capacity from 10,000 bbl. daily to 12,500 bbl. daily with the addition of a 2,500-bbl. unit.

Gas Plans Weighed

Smaller processing units studied for Wyoming field

DENVER.—James P. Sloss, Denver independent, announced last week that plans may be modified for a gasoline plant to process gas now flared in the Greater Clareton field of Weston County, Wyoming.

Sloss, chairman of the Greater Clareton Producers Committee, said there is sentiment among some producers to abandon an idea of erecting a 50,000 M.c.f. per day plant in favor of five smaller units scattered throughout the field. Either plan will cost approximately $3,000,000 Sloss estimated.

The future of the project, he said, depends on Core Laboratories, Inc., tests of the 615 wells in the field to determine those producing in excess of 5,000 cu. ft. of gas per barrel of oil *(The Oil and Gas Journal, March 14, page 96)*.

"Then we'll know how much gas is available and where it is," Sloss said. A definite decision is expected on the plant project within 60 days.

Core Laboratories was hired to test the wells by the Wyoming Oil and Gas Commission which recently ordered all wells producing in excess of the 5,000:1 oil-gas ratio shut in.

Atomic Energy No Peril to Oil

CASPER, Wyo.—Nuclear energy will not replace petroleum products as a source of power in the foreseeable future, an Atomic Energy Commission official told Rocky Mountain oilmen.

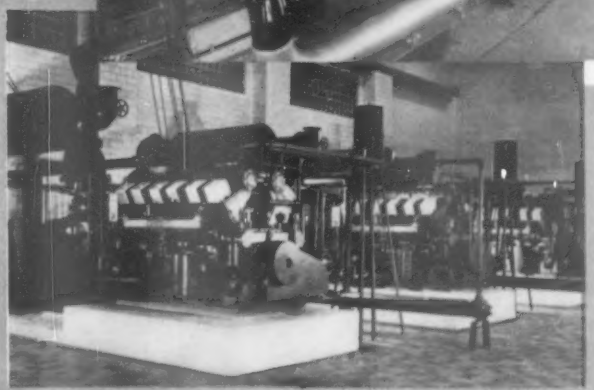
Allan C. Johnson, manager of the Idaho AEC operations office at Idaho Falls, told the spring meeting of the Rocky Mountain district of the American Petroleum Institute's division of production he sees a partnership between petroleum and uranium rather than competition. He added this would be true particularly when technological improvements have made nuclear fuels competitive.

A. L. Solliday, executive vice president of Stanolind Oil & Gas Co., Tulsa, criticized federal regulation of natural gas. He declared if the Government could fix prices on natural gas it followed the same controls could be placed on other natural resources or on any products sold in interstate commerce, including even automobiles.

Harry G. Fair of Bartlesville, Okla., vice chairman of the operating committee of Phillips Petroleum Co., also pointed out that as a result of such federal regulation producers are unwilling to take the long financial risks involved in drilling additional wells for gas. This will result, he said, in declining reserves of gas to meet the skyrocketing national demand.

R. M. Churchwell of Ohio Oil Co., Casper, was elected division chairman, succeeding H. B. Gernert of Trigood Oil Co., Casper.

Six state vice chairmen elected were George Goodin, Petroleum Information, Casper, for Wyoming; Ray Wright, Sinclair Oil & Gas Co., Denver, for Colorado; R. E. McMillen, Ohio Oil Co., Sidney, for Nebraska; R. W. Gemmer, Carter Oil Co., Billings, for Montana; L. S. Fuller, El Paso Natural Gas Co., Salt Lake City, for Utah; and Roy Fuller, Amerada Petroleum Corp., Williston, for North Dakota.



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Harris Fight Lines Drawn

Committee hopes by April 29 to hear all sides to proposal freeing natural-gas producers from federal price controls

WASHINGTON.—With a long list of witnesses yet to be heard, the House interstate commerce committee is aiming at an April 29 windup of its hearings on the Harris bill exempting independent gas producers from federal price regulations. Given a break, the committee may send a bill to the House floor by mid-May.

Last week, the committee heard utility gas consumers, the coal industry, and domestic consumer groups. This week, the committee will hear state and city officials.

The lineup on the Harris bill is now pretty well defined.

The oil and gas industry and the pipelines support the bill as written. But the pipelines want some changes more clearly protecting them in the valuation of their reserves and renegotiation of contracts.

Utility consumers are not united. Some want a "proper" regulation of independent producers without making public utilities of them or fixing prices on the basis of original cost. A few favor the Heselton bill which would regulate only those producers with interstate sales of more than 2 billion cubic feet yearly.

Oppose dumping . . . State and city officials want Congress to stand back of the Supreme Court decision in the Phillips case. Some apparently would compromise on the basis of the Heselton bill.

The coal industry backs the idea of the Harris bill. But it wants some changes that would prevent what it calls "dumping" sales along the pipelines and other safeguards for coal markets against competition of natural gas.

Coal interests will oppose the bill unless a ban on the sale of gas for boiler fuel and other suggested changes are written in.

This was made clear by witnesses who warned the country already has passed the "peril point" in exhausting its gas reserves. The heavy consumption of gas under boilers has been a big factor in forcing the pipelines to draw more quickly upon higher-cost gas reserves, they charged.

Unless conservation measures are adopted, Dr. Ford K. Edwards of the National Coal Association said, the eastern states "could be" reduced to a hand-to-mouth basis in 10 to 15 years.

Edwards admitted he does not expect this to happen. Efforts to find new supplies will be stepped up as necessary. But it does indicate the increasing pressure of demand on supply, he said.

Edwards pointed out that since 1946 the life index of the Texas reserves has fallen from 41.2 to 22.1 years. Last year, for the first time, the state's total gas reserves dropped. In Louisiana the life of known reserves has dropped from 36.9 to 24.4 years since 1946.

With a 660 per cent increase in the volume of sales since 1938, the committee was told, there has been heavy pressure on price increases. "The two-cent field gas has now been replaced by nine-cent gas, and the nine-cent gas is in a fair way to be replaced by 20-cent gas," Edwards said.

Finally, there is some pressure for pipeline rate-making on the basis of original cost of the pipelines' own gas.

A large group of northern utilities asked the committee last week to bar present types of escalation clauses in contracts between the pipelines and independent producers. No matter how they are written, it was charged, they call only for increases—never for reductions.

The views of 16 companies serving over 17,000,000 people from Virginia to New England were given by Randall J. LeBoeuf, Jr., counsel for the Consolidated Edison Co. of New York. He warned that unless the "disorderly and unpredictable" trend of rate increases is stopped, natural gas may price itself out of the market.

Basis for exemption . . . LeBoeuf said independent producers should be exempt from Federal Power Commission regulation. But that exemption should depend on four other points which he outlined:

All sales contracts must be filed with the FPC by the company first moving the gas interstate. Sixty days' advance notice must be given in the case of new contracts so that distributing companies may have a chance to give their views on price.

All two-party favored nation, price renegotiations and redetermination clauses, spiral types of escalation and price redeterminations based on prices offered or paid by third parties should be outlawed.

Only clauses covering escalations to meet taxes actually imposed or of predetermined amounts at fixed periods should be permitted.

Contracts which contain escalation clauses not permitted in the two points above should be subject to regulation.

LeBoeuf argued that this plan would meet the aims of both the producers and consumers of natural gas. It would not entirely lift controls on producers, he said. But it would give them relief as far as consistent with the protection of consumers. It would provide a "middle ground," he asserted, between the complete exemption from control asked by the producers and the well-to-consumer control which some public groups are seeking.

New Carrier Policy

Competitive transportation system for U. S. is urged

WASHINGTON.—A national transportation policy under which pipelines, railroads, water and highway carriers would be fully competitive was urged by a presidential advisory committee last week.

The cabinet-level committee called for a minimum of government interference, consistent with the public interest, "to the end that the inherent economic advantages, including cost and service advantages, of each mode of transportation may be realized in such a manner as to reflect its full competitive capabilities."

Outworn regulations and practices are imposing large and unnecessary costs upon carriers, shippers and the public, Commerce Secretary Sinclair Weeks, committee chairman, said.

Now it is proposed to permit greater reliance on competitive forces in rate-making. Other steps offered by the committee also would be aimed at developing a modern and financially strong transportation system to meet defense and economic needs.

Interstate Commerce Commission control of common-carrier rates should be continued, the committee said. But the ICC should not order rates that do not cover the direct cost of service, as a minimum, nor rates that are unreasonably high. For the most part, schedules filed by carriers should be accepted except where there is reason to believe they may be unlawful.

Another recommendation calls for

redefinition of private motor carriers to cover only private truck operators distributing their own products and supplies from plants or distribution centers and return hauling of materials to be used in their own operations.

The committee suggested repeal of the bulk commodity exemption for water carriers. This applies to vessels carrying not more than three bulk commodities. Barge tows are considered as single vessels. Such carriers, it said, need not publish their rates and are able to obtain competitive traffic by quoting lower than the published rate.

Repeal of the exemption would give the ICC control of common and contract water carriers on the inland waterways, coastal waters and deep sea routes and the Great Lakes. It would not affect the exemption now given transportation of bulk commodities by contract carriers in nonocean going vessels on international waters.

Oil From Coal Near

Mines Bureau developing new one-step conversion

WASHINGTON.—One-step conversion of coal to oil is just around the corner.

The Bureau of Mines tried out a new hydrogenation process on a pilot-plant scale at its Bruceton, Pa., laboratories last year. It gave nearly complete conversion. But only small amounts of gasoline and gaseous hydrocarbons were recovered and the plant suffered overheating trouble. The reactor was redesigned and more tests will be made this year.

The bureau's work under the Synthetic Liquid Fuels Act was reported to Congress last week. The two-volume report covered the work on both coal and oil shale.

The bureau made considerable progress on coal gasification. It dropped work on atmospheric-pressure gasification when a chemical manufacturer installed the process the bureau had worked on.

The big aim now is conservation of power and reduction of costs in producing raw materials from coal for chemicals, synthetic liquid fuels and pipeline gas. The bureau is also working on equipment to gasify coal under pressure.

Several developments were made in production of oil from shale at the Rifle, Colo., plant which is to be shut down in the near future. The bureau reported that the gas combustion retort, with a capacity of 150 to 300 tons a day, operated 59 days without serious difficulty.

WATCHING WASHINGTON

Bertram F. Linz

Uncle Sam Big Landowner

Ever wonder how much of these United States the federal Government owns? Well, its slightly more than one-fifth, 21.3 per cent to be exact.

Federal ownership takes in 405,088,568 of the nation's 1,903,824,640 acres of land. More than half of it—212,100,000 acres—is under the control of the Interior Department. Most of the rest is controlled by Department of Agriculture.

Most of the land came to the government without cost. But it has bought a great deal. And it has put up 428,786 buildings. The original cost of purchased land and of the buildings and other things it has put up totals over $30 billion. But more than 60 per cent of this money went for military facilities.

In four states the government owns more land than do the citizens. It owns 87.4 per cent of Nevada, 65.3 per cent of Idaho, 64.6 per cent of Utah, and 51.8 per cent of Oregon. It owns considerable chunks of such oil states as Wyoming, 47.7 per cent; Montana, 30 per cent; Colorado, 36.2 per cent, and New Mexico, 32.6 per cent. It owns 42.6 per cent of California, but only 3.2 per cent of Texas and 2.2 per cent of Oklahoma.

The government owns land in every state, but its smallest acreage is in the District of Columbia. There, however, its 11,297 acres represent 29 per cent of the total.

MSTS Costs Government

Government tanker service is more expensive than that of private operators. It deprives the Treasury of taxes. And it idles private tankers, with no assurance they will not be scrapped or deteriorate from lack of use.

Those were the conclusions of a task force of the Hoover commission on government organization which studied federal transportation policies. On them, the committee made its recommendation that the Military Sea Transportation Service get out of the tanker business *(The Oil and Gas Journal, April 11, page 87)*.

The study showed that tanker owners spend $7,000 per ship per month to maintain a tanker mobilization reserve while government ships haul oil at a cost of 9 cents or more per 1,000 ton miles over private tanker costs.

Not all of the costs of tanker service appear on MSTS books. There are the pay and allowances of military personnel, vessel depreciation, interest and Panama Canal tolls. They aren't on the books. But the General Accounting Office figured them to total over $101,000,000 in 1953.

Price Wars Rough, Too

It's as hard for industry to prevent wars as it is for nations to.

The Senate Small Business Committee has been studying gasoline price wars for 5 years. It hasn't come up with a remedy yet. But neither have the oil companies, Chairman Edward J. Thye of Minnesota points out.

New Jersey has been one of the most fought-over battlegrounds. And a vicious price war broke out this month in Florida. Economic wars take their toll just like shootin' wars. The casualties are small businessmen. The biggest fact found by the committee in its many investigations is that the rate of turnover in service-station owners or lessees is much higher than the rates for retailers in other lines of business.

Some see the cause of these wars to be discriminatory pricing practices of the major oil companies. Others see it as an effort of some operators to increase their volume at the expense of competitors. The committee has never been able to pin point the reasons why cut-price signs blossom out at service stations all of a sudden.

A number of remedies has been suggested: a limit on the size of price signs at service stations; a ban on sales of gasoline at less than a certain mark-up above costs; and Federal Trade Commission action under the Robinson-Patman Act.

So the committee is going to make another try at outlawing war. It may go into the situation in a number of states. But it is going first into that in New Jersey. And the 12 major companies in that area have promised their full cooperation. They too, have a big stake in the prevention of war.

Gas Secrets Bared

19 firms reported owning 43 per cent of reserves

WASHINGTON.—Figures on gas reserves of the larger producers are nearly a trade secret and hard to get.

The House interstate commerce committee wanted the figures for its study of the Harris bill. Rep. John Heselton of Massachusetts said he understood that 30 companies own a total of 134.3 trillion cubic feet, or approximately 63 per cent of the total proven reserves.

A survey of various reports, including those filed with the Securities and Exchange Commission, brought up figures for 19 companies. They were found to control 91 trillion cubic feet or 43 per cent of the total reserves.

Figures furnished the committee showed that Humble Oil & Refining Co. has the largest reserves of those reported, 16 trillion cubic feet.

The following table shows the reserves of the 19 companies:

(Trillions of cubic feet)

Humble Oil & Refining Co.	16.0
Phillips Petroleum Co.	13.2
The Texas Co.	10.5
Stanolind Oil & Gas Co.	9.9
Magnolia Petroleum Co.*	7.5
Union Producing Co.*	4.0
El Paso Natural Gas Co.	3.8
Pure Oil Co.	3.7
Panhandle Eastern Pipe Line Co.	3.5
Skelly Oil Co.	2.3
Atlantic Refining Co.	2.2
Continental Oil Co.	2.2
Ohio Oil Co.	2.1
Union Oil Co. of California	2.1
Shamrock Oil & Gas Corp.	1.7
Sinclair Oil & Gas Co.*	1.7
Tide Water Associated Oil Co.	1.7
Sunray Oil Corp.	1.5
Western Natural Gas Co.	1.4
Total	91.0

*Includes affiliated companies.

Tax Repeal Urged

States would get gasoline levy for roads under plan

WASHINGTON.—Repeal of the federal gasoline tax was urged last week by the Council of State Chambers of Commerce.

The council outlined a highway-construction plan under which the states would reimpose the 2-cent tax. They would be required to use all the revenue for road building. If they did not, the federal Government could recover the tax and use it for highways.

Under this plan, the council claimed, there would be a saving of the $11,500,000,000 interest cost of the administration's plan for a $101 billion 10-year highway program. A presidential committee suggested that revenue from the federal tax on gasoline and lubricating oil be used to retire a bond issue for the government's share of the cost.

Under a plan offered by Senator Byrd of Virginia, the federal gasoline tax would be transferred to the states. The lubricating-oil revenue would be kept to help finance the government's road building, which would be on a pay-as-you-go basis.

The council favors the Byrd plan over all others, but says that while highway needs are great they are not so urgent that Congress should act without a complete study of all angles of the building program.

FPC Rebukes Pan Eastern

Commission refuses to let firm in on American Louisiana sales hearings; Wisconsin groups spearhead opposition

WASHINGTON.—The Federal Power Commission has told Panhandle Eastern Pipe Line Co. that the firm has no right to participate in hearings on sales to American Louisiana Pipe Line Co.

FPC previously had given American Louisiana permission to build its 1,121-mile line from North Tepetate, La., to near Detroit if the company's gas suppliers agreed to obtain FPC authorization under Orders 174-A and 174-B *(The Oil and Gas Journal, October 11, page 102).*

Panhandle Eastern appealed this decision by the FPC to the Philadelphia Circuit Court of Appeals, but the court failed to agree with the firm *(The Oil and Gas Journal, March 14, page 85).*

Hearings begun . . . The commission began hearings last week on the application of four producing companies for certificates to sell natural gas to American Louisiana. The firms, Superior Oil Co., Kerr-McGee Oil Industries, Inc., Stanolind Oil & Gas Co., and British-American Oil Producing Co., said they would accept the certificates, but that they would not waive their rights to contest Orders 174-A and 174-B.

FPC Examiner Richard N. Ivins indicated the commission would not consider acceptance of the certificates as a waiver of the legal rights of the producers.

Although Panhandle Eastern was denied entrance to the hearings, the Wisconsin Public Service Commission and the State of Wisconsin were allowed. Limited participation was given to a number of other public bodies.

The groups do not oppose the producers' sales, but attack the escalation and favored-nation clauses in the American Louisiana contracts.

Wisconsin state authorities asked the FPC to dismiss the applications at the first of the hearings. They charged that the producers were seeking the benefits of the certificates while denying that the Natural Gas Act does not apply to them. The state officials were particularly critical of statements by the producers' counsel that company management would want to review the certificates before accepting them.

Tanker Mortgages Insured

WASHINGTON. — The Maritime Administration will approve federal mortgage insurance of up to 78.75 per cent of the cost of new tankers to be built for long-term charter to the Navy.

This amount was approved for the United Oceanic Corp., which is to build from two to five supertankers for the Military Sea Transportation Service.

Technically, the Government will insure 90 per cent of mortgages representing 87.5 per cent of the cost of the tankers. In the case of United Oceanic, the shipyards building the vessels are to aid in the financing.

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Texas Chops Allowable

Railroad commissioners show resentment at mounting crude imports but still trim May production 200,000 bbl. daily

AUSTIN. — Resentment against climbing oil imports flared again last week at the monthly Texas crude-oil allowable hearing before the Railroad Commission which chopped more than 200,000 bbl. daily off the April oil allowable.

The May allowable was set at 3,072,150 bbl. daily—205,902 bbl. daily below that in effect April 9 and 202,924 bbl. daily under the initial figures for April.

In spite of the big slash, which came a month later this year due to prolonged strong demand, most purchasers wanted still less crude produced in the state next month.

Purchasers' recommendations as to the number of producing days next month ranged all the way from 14 to 17 days.

Stanolind Oil Purchasing Co. favored 14 but nominated on 15 days. Sun Oil Co. on the other hand thought the pattern should be 17 days to provide all the oil the company wanted. Seven firms—Humble, Cities Service, Magnolia, Shell, Tide Water, Continental, and Pan American—asked for 15 days. This would have meant a whacking 330,000 bbl. a day cut from April 9.

Only three firms—Texas Co., Gulf, and Sinclair—recommended the 16-day rate eventually set by the commission. This was only 1 day less than in April, but the reduction is magnified on a per-day basis because May has 31 days compared with April's 30.

Quizzed on imports . . . The commission's decision wasn't unanimous. Commissioners Thompson and Murray agreed on 16, while Olin Culberson stuck with 17. After the vote Murray, chairman, said he hoped time would prove Culberson right.

During the imports clash, all three commissioners hopped on Cities Service Oil Co.'s representative, Gerald McGrew, when he said Cities Service nominated on 15 days but could get along on less oil than that.

"On account of your imports?" Thompson asked.

McGrew replied that the company's oil take from Texas had increased along with imports.

Thompson quizzed him at length on imports, the firm's new 300,000-bbl. tanker and other factors. The commissioner said that McGrew confused him by saying that Cities Service was importing more oil, wanting more Texas crude, and yet nominating for less.

McGrew answered that Cities Service had become overstocked the past month. When Culberson demanded to know why, McGrew said it was simply that Cities Service had refined a million fewer barrels than it had purchased.

Murray asked McGrew if the Cities Service plan to increase imports by 15,000 bbl. a day in May had anything to do with the firm's reduced demand for Texas crude. McGrew answered that he got his information on import intentions from the commission tables but assumed that the increase was due to tanker schedules.

Thompson closed the quiz by saying that Cities Service wanted less Texas crude because it is importing more foreign oil.

Stanolind's Dietler supported McGrew, pointing out that refinery runs during the first week of April dropped below 7,000,000 bbl. a day for the first time in many months.

He said imports have some effect and should be restrained, but added "we can't crowd imported oil off the market by drowning ourselves in domestic crude." He asked that the commission carefully consider 15 days, though Stanolind he said, would prefer 14.

H. P. Nichols fought for a steady high allowable. He told the commission that if it started cutting, it would continue to cut and give importers a reason to import even more oil.

MAY ALLOWABLES

District—	May	Change from April 9
1—Southwest	64,656	— 1,772
2—Gulf Coast	146,005	—12,249
3—Gulf Coast	472,301	—25,872
4—Southwest	247,194	—15,913
5—East Central	47,802	— 2,793
6—Outside E. Texas	122,967	— 9,947
6—E. Texas field	215,586	—19,751
7-B—W. Cent. Texas	168,253	— 8,611
7-C—W. Cent. Texas	214,575	—17,209
8—West Texas	986,884	—78,916
9—North Texas	273,603	—12,363
10—Panhandle	112,324	— 506
Total	3,072,150	—205,902

Unwanted oil . . . Evidence that there is oil without a market was presented to the commission by J. G. Puterbaugh, president of McAlester Fuel Co., owner of about 450 producing wells in five states, and Price Parker of Monterey Oil Co.

Puterbaugh said McAlester is unable to find a buyer for 450 bbl. of oil daily from Conroe field in Montgomery County, Texas. He said a contract for sale of the oil expires April 30. It would be disastrous, he said, for the commission to allow production the public won't buy, adding that he had seen the coal industry destroy itself and didn't want oil to do the same thing.

Parker told the commission that Monterey and two other firms will be unable to market 5,400 bbl. of oil a day from Wilshire (Ellenburger) field in West Texas after May 1. He said Cities Service is cutting off pipeline connection as of that date and that Sinclair, the only other line in the field, refused to take the oil.

Thompson commented that this instance showed that it was not a shortage of Texas oil which forced Cities Service to increase its imports.

Poor Plugging Hit

Texas acts to halt water pollution from old wells

AUSTIN.—The Texas Railroad Commission is cracking down on operators who endanger fresh-water supplies by plugging abandoned wells improperly.

Those who are careless may find themselves without pipeline connections, Commissioner Olin Culberson warned last week.

Culberson in a prepared statement said he intended to see that "valuable and diminishing fresh-water supplies in Texas" are protected by requiring that rules of the commission be complied with in all instances. He said he would not tolerate laxity in plugging abandoned wells and cited a recent incident to prove it.

He said certain West Texas ranchers recently told him that their fresh-water wells were threatened by salt water from a well improperly plugged in 1952. The operator who drilled the well was contacted, Culberson said, but refused to cooperate, passing the blame to California interests which had financed the well.

Culberson said he then advised the operators that pipeline connections of

their only producing property in Texas would be severed if the well was not replugged properly. The operators ignored the warning and pipeline connection was cut off. It was not restored until the commission rules were followed and the well plugged, Culberson said.

The commissioner said he cited the specific case so that operators would know he was willing to go a long way to force compliance with commission rules in respect to fresh-water pollution.

Crude Loop Started

Magnolia awards 215-mile contract to Burden, Zachry

DALLAS.—Magnolia Pipe Line Co. has kicked off construction of 215 miles of 12, 14, and 16-in. pipeline along its crude system from Midland to Corsicana, Tex.

Spreads of O. R. Burden Construction Corp. and H. B. Zachry Co., contractors on the project, will work from the ends toward the center.

At midweek, about 5 miles of pipe had been laid by Zachry from the Corsicana end, with the stringing crews working about 10 miles ahead of the welders. Work is not yet under way on the Midland end but is expected to start soon and end in October.

Magnolia now operates a 335-mile 12-in. line, looped in places, between the two towns. The new work will fill in the gaps between loops and give the company two complete lines.

L.P.G. carrier . . . One of these, an 8-in. carrier, will be converted to carry natural gasoline and L.P.G. when the work is finished. From Corsicana the products will be piped on into Magnolia Petroleum Co.'s 200,000-bbl. Beaumont refinery through an existing 10-in. line *(The Oil and Gas Journal, March 21, 1955, page 131)*.

Magnolia plans to do the conversion work itself. This will involve building two new pump stations and converting others to products service. A Magnolia official said the line should be ready to carry products in about a year. Its capacity will be about 25,000 bbl. of products daily, but it is expected that deliveries will probably be nearer 20,000 bbl. daily to start.

A Magnolia official last week said the products stream would be separated in new facilities at the Beaumont plant. The natural gasoline will be processed at the plant, with butane and propane moved through existing lines to the company's underground-storage operation at Hull, about 30 miles west.

Tax Cut on Gas Is Revoked

Texas House votes to peg sliding levy at 8 per cent; tax on gasoline hiked cent; industry wins other fights

AUSTIN.—Industry fears that revenue-hungry Texas legislators would cancel scheduled cuts in present taxes on natural-gas production have been borne out.

The gas tax was increased to a whopping 9 per cent in an emergency revenue-raising session last year. The legislature provided, however, that the rate was to drop to 8 per cent on September 1, 1955, and to 7 per cent September 1, 1956.

An amendment tacked to an omnibus tax bill tentatively passed by the Texas House last week provides that the 8 per cent rate which goes into effect this fall will become permanent. This would bring in $6,000,000 a year.

The omnibus bill also calls for a 1-cent a gallon increase in the state gasoline sales tax, which would rake in another $24,000,000 of a total of $50,000,000 a year the bill would produce.

The industry otherwise fared well taxwise. These other tax proposals were beaten:

. . . Permanent gas - production taxes of 8.5 and 8.9 per cent.

. . . An amendment to the chain-store tax which would have included service stations.

. . . A "business activities" tax on value added by manufacturing, refining, chemical processing, pipeline, and utility firms.

. . . A gas production tax of 1 cent per M.c.f. instead of present production levy. This was the measure which would have required producers to pass on taxes to interstate pipelines.

. . . An increase in the crude-oil production tax from the present 4.6 per cent of market value to a flat 5 per cent.

. . . A processing tax of one-fortieth of 1 cent a gallon on all combustible fuels manufactured by refiners, natural gasoline plants, and others.

Supporters of HB7, the so-called economic-waste gas bill, were defeated in an effort to work the measure in as a part of the big revenue-raising bill. This proposal provides that the Texas Railroad Commission could force renegotiation of gas-purchase contracts and set up a minimum price in fields or areas where it decided gas waste was occurring because of low prices.

A lot could happen . . . Although the bill for new taxation appears to be rounding into form, a lot could happen yet before it becomes law.

If the bill passes the house, it will go to the senate, which probably will change it in some respects. The measure then will be pounded into final form in a joint committee of house and senate, and it is in this last stage that such a tax measure often is actually written.

Economic waste . . . In other action, the house passed a resolution which would permit either house to take up the economic-waste bill at any time. This will expedite consideration of the bill, but is no guarantee of passage. It is felt that some members of the house voted for the resolution as a favor to HB7's backers in return for their favorable vote on another bill.

Oil Takes a Bow

Sherman to say thanks in 2-day local celebration

SHERMAN, Tex.—This North Texas town of 30,000 is going all out this week to show its appreciation of a fast-growing local oil industry.

The Cel-Oil-Bration starts April 25 and will feature 2 days of field tours, equipment exhibits, and congratulatory addresses by city, state, and federal officials.

Highlight will be a banquet April 26. Principal speaker will be Dr. Arthur S. Flemming, chairman of the Office of Defense Mobilization and a member of the President's advisory committee on oil and gas.

Fifty oil and service companies plan to exhibit products, processes, and equipment in an educational display.

Visitors will be offered tours of Sherman and Sandusky fields. Sherman field has been extended into the city, and town-lot drilling is going ahead rapidly. At last count there were 32 producers within the city limits. Sandusky is nearby.

Oil is relatively new to Sherman, and the play didn't begin in earnest until Standard Oil Co. of Texas hit pay dirt ½ mile north of town in August 1947. By 1952 there were 250 wells in the field.

Another and even bigger surge of activity took place that year when deeper drilling to about 7,500 ft. discovered prolific sands. Last year 233 new producers were added in Grayson County, and 61 rigs now are active around Sandusky.

Guatemala Oil Play Near

Nation hopes to complete new law this summer and open way for exploration, development by foreign companies

THE Guatemalan Government plans to complete new legislation by midsummer opening the nation to oil exploration by foreign companies.

When the legislation now under consideration is passed and regulations drawn up, the government will entertain requests for oil exploration and drilling concessions.

The new legislation is based on a similar law recently adopted by Turkey. The measure generally provides for Guatemala to share half of any profits realized from petroleum discovery and export.

Details call for the country to receive 12½ per cent royalty payments and for sliding surface land taxes which are reduced proportionally to the amount of surface or subsurface investment made. The nation also may take all its royalty payments in oil and will receive the 50-50 profit sharing after all other tax payments are deducted.

The proposed law puts a 600-hectare (about 1,483 acres) limitation on foreign holdings and fixes a minimum annual investment a concession holder must make. This is based on the size of the investor's holdings.

There is no initial tax on a concession. However, the proposal provides that where two or more companies compete for the same property, it will be awarded to the company willing to make the largest cash bonus payment to the Guatemalan Government.

Major oil firms which have expressed interest in Guatemala include Standard Oil Co. of California, Union Oil Co. of California, The Texas Co., Houston Oil Co. of Texas, Phillips Petroleum Co., Standard Oil Co. of New Jersey, Atlantic Refining Co., Ohio Oil Co., and Conorado Petroleum Corp.

Interest by the oil companies has been centered in the Peten Province area where oil seepages have been reported for years. Richmond Oil Co., a California Standard subsidiary, obtained temporary survey permission to explore the region last January.

Unfriendly political atmosphere, however, has stalled any action by foreign oil interests. Restrictive and nationalistic legislation plus an unfriendly attitude toward U. S. interests by the Communist-dominated regimes of Juan Jose Arevalo and Jacobo Arbenz blocked foreign capital.

The attitude changed with the successful anti-Communist revolt last June when Col. Carlos Castillo Armas overthrew the Arbenz government. The new government is determined to permit foreign companies to exploit possible oil deposits to aid the country's economic position.

Present legislation was drafted by a government commission which enlisted the aid of Roy Merritt, petroleum advisor to U.S. Secretary of State John Dulles, and two Washington, D.C., oil experts.

Cuban Test Drilling Ahead

Cuban-Kewanee Oil Co. last week was below 5,600 ft. on its wildcat in the Jarahueca-Motembo area of central Cuba. The test is projected to 9,000 ft.

Cuban-Kewanee owns a three-fourths interest in a 10,000-acre block in the Jarahueca - Motembo concession. This concession lies to the northwest of the Echevarria concession where Kerr-McGee Oil Industries, Inc., drilled the Jatibonico discovery well for Corp. General de Petroleos (Iglesia Group).

The Cuban - Kewanee wildcat was spudded in February.

W. W. Smith, Philadelphia, president of Cuban-Kewanee and Kewanee Oil Co., said Cuban-Kewanee is interested in expanding its operations in Cuba and is negotiating for additional acreage.

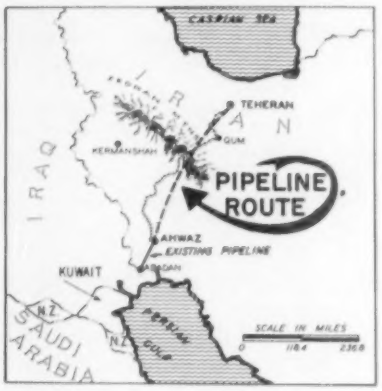
Delta Expands Operations

Delta Drilling Co., of Tyler, Tex., has increased its holdings in Venezuela and is now the second largest drilling firm operating there.

Delta, through its Venezuelan subsidiaries, Perforaciones Delta C.A. and Perforaciones Guarico C.A., recently acquired the four rigs and the drilling business of Compania Anonima Maracaibo Towing Co. of Maracaibo.

The company also has purchased the surplus drilling equipment of Richmond Exploration Co.

Clyde Johnson, formerly with Loffland Brothers in Venezuela, has been named vice president of the Delta Venezuelan companies and will be in charge of operations.



Iranian Line Planned

Pipeline to Teheran will carry Abadan's products

CONSTRUCTION of a 573-mile, 10-in. products pipeline from Ahwaz to Teheran, Iran, will begin in September.

The $32,200,000 line will have a capacity of 40,000 bbl. daily. It will relieve the hard pressed railroad that transports petroleum products most of the way from the refinery at Abadan to the capital.

The National Iranian Oil Co. has signed construction contracts with British and French firms.

Costain-John Brown, Ltd., London, will build the 337-mile southern section of the line at a cost of $18,200,000. The route will cross the Zedran Mountains at more than 10,000 ft. above sea level. This is believed to be the highest line elevation in the Eastern Hemisphere.

Entrepose, Paris, will build the northern 236 miles at a cost of $14,000,000. No pumping stations will be erected in this section. The British and French-built portions of the line will join at Izni, southwest of Teheran. A line already exists between Abadan and Ahwaz.

National Iranian will pay for the line from oil income. Under the consortium agreement, Iran will receive about $87,000,000 in royalties during the first year of operations and about $187,000,000 yearly when at full production.

While Iran is one of the world's major oil producers, transportation problems have put a damper on consumption in interior areas. Present consumption is about 32,000 bbl. daily.

A 2,500-bbl. daily capacity refinery at Kermanshah, which uses production from a nearby field, supplies the marketing needs in that area.

Austria May Regain Fields

Return of valuable properties one of main points settled in peace treaty with Russia; approval now up to Allies

AUSTRIA soon may regain control of its oil fields from the Soviet Union.

Return of oil properties was one of the main points settled in the Austrian-Soviet state treaty. Under its terms, Russia agreed to give up its oil concessions, oil exploration rights, oil refineries, and its shares in a joint Soviet-Austrian oil-trading company.

On its part, Austria agreed to supply one million tons of oil annually (about 19,000 bbl. daily) to the Soviet Union for 10 years. This is roughly a third of the country's present output.

The treaty listed the terms under which the Soviet Union will give Austria her independence. The United States, Britain, and France must sign before the treaty can go into effect.

The precise reference to oil in the joint statement issued in Moscow by Austrian and Soviet Union representatives said: "The Soviet Government agreed further to cede to Austria the oil fields and refineries, including the company for trade in oil products . . . in exchange for the delivery of crude oil in amounts agreed to by the parties."

The comparatively favorable treaty terms were viewed in Western quarters as a possible political maneuver. The Moscow terms have propaganda value for the present and the fine-print details of the agreement are yet to be worked out, some observers said.

If the deal goes through, however, one of the bright spots for Austria is that the Russians will relinquish the right to drill Austria's most promising acreage. These areas include a triangular area in the northeast corner of the country near the Hungarian and Czechoslovak borders and another near the Hungarian frontier further south.

Sixty per cent of these exploration areas would have gone to Russia under terms of a 1949 treaty which the Russians never approved. Moreover, this provided that Russia receive 60 per cent of Austrian production for 30 years along with refining concessions.

The Russians seized the Austrian oil industry at the end of the war on grounds it consisted of "former German assets to which they were entitled under the Potsdam Agreement."

Under Rusisan control, crude output increased from about 8,500 bbl. daily in 1945 to about 62,000 bbl. daily. This was due to discovery and development of several new fields in the 3,000-sq.-mile basin northeast of Vienna.

Fields presently producing in Austria are believed approaching a permanent decline. This is due in part to the policy authorities followed to achieve cheap and quick results. It was reported that the Russians abandoned their development work in the southern part of the basin last year after drilling 27 dry holes.

Refinery Dedicated

Cubatao plant operates at above rated capacity

THE refinery at Cubatao, Brazil, has passed its tests and is now officially in operation.

President Jaao Cafe Filho inaugurated the government-owned project, which has an important role in Brazil's efforts to expand its nationalized oil industry.

The refinery, located between Santos and Sao Paulo, has been operating since January 31 on a test basis. Designed with a capacity of 45,000 bbl. daily, its throughput has been 53,000 bbl. daily, but operators report the capacity could be expanded to 60,000 bbl. daily. The refinery was built in 6 years at a cost of about $50,000,000. Facilities include the crude unit, visbreaker, naphtha recovery, treating, catalytic polymerization, an Edeleanu unit, and hydrocodimer for aviation gasoline with use of codimer for catalytic polymerization.

An asphalt plant is scheduled for completion in November. It will produce 116,000 tons of asphalt yearly, enough to supply Brazil's road-building needs. A petrochemical plant with a capaicty of 10,000,000 lb. of styrene monomer a year will be built adjacent to the refinery. It will supply the domestic plastics industry.

Crude for the refinery will be supplied by two American firms. Esso Export Corp., an affiliate of Standard Oil Co. (N.J.), will furnish 30,000 bbl. daily. California Transport Corp., a subsidiary of Standard Oil Co. of California, will supply 15,000 bbl. daily. The contracts involve a total of $200,000,000 and will run for 5 years.

The refinery can handle nearly 30 per cent of Brazil's current needs of finished products. It saves about $70,000 daily in foreign exchange by buying less expensive crude.

Big Mexican Project

$26 million facilities are opened in Poza Rica field

THE Petroleos Mexicanos has opened new and enlarged secondary recovery and field processing facilities at Poza Rica field. Equipment is designed to increase production from 87,000 bbl. daily to more than 100,000 bbl. daily.

Compressor units for gas injection and a treating plant for water flooding have been set up near the field's No. 2 well. Other construction includes a gasoline absorption plant, a storage plant for propane gas, and separation and compressor plants.

Mexican sources say the construction cost will be $26,000,000 and if over-all expenses are included the cost would exceed $40,000,000. In scope and cost, the facilities are said to be the biggest single group of installations in the Mexican oil industry in 16 years.

According to latest available figures, Poza Rica produces about one-third of Mexico's present output of about 240,000 bbl. daily of crude. Pemex has renamed the area the "New Golden Lane."

Barinas Tests Abandoned

Sinclair Oil Corp. has abandoned one step-out well and two wildcats in its Barinas concession in Western Venezuela. The tests pentrated sands found productive in the four Sinco wells but no significant shows were encountered. The extension well, No. 7 Sinco, was drilled to 9,571 ft. The wildcats, No. 1 Canagua and No. 1 Masparro, were taken to 8,808 ft. and 7,656 ft. Sinclair discovered oil in the concession in May 1953. Since then, 66,000,000 bbl. of recoverable oil have been proved *(The Oil and Gas Journal, April 18, page 115).*

Suez Tolls Extended

Reduced toll rates at the Suez Canal that were placed into effect last year have been extended until further notice.

The toll costs average about 10 cents per barrel of oil, although the cost per barrel on any given shipment may vary. Rates are based on Suez net tons, which are figured by an 1873 formula that determines "useful capacity" of a vessel.

In the case of tankers this is normally between 48 per cent and 57 per cent of deadweight tonnage. The levy of 97½ cents per Suez ton for loaded ships is a decrease of about 7 per cent from the former rate.

INJECTION WATER for SACROC is pumped by three identical pump stations. Fig. 1.

SACROC . . . *Biggest Water-Flood Acreage*

Its modern injection system sets a pattern for efficiency

Proof of the careful planning, construction, and initial operation that went into SACROC Unit's water injection system is the fact that all 53 injection wells were put in operation within 12 hours on the date authorized by the Railroad Commission of Texas. Now, the operating force is only four men on duty at a time, one at the treating plant, and one at each of the three injection stations. This article tells how the system is laid out for that efficiency.

by Ed McGhee
District Editor

HERE are some of the features of the SACROC water-injection system:

1. Three identical high-pressure water-injection stations in separate parts of the field.
2. A low-pressure water system to supply injection stations.
3. Gravity flow through the treating plant.
4. Reclaiming of water from backwash and desludging operations.
5. Semiautomatic backwash of filters.
6. Mechanized handling of treating chemicals.
7. Automatic shutdown controls in case of high or low water pressures.

The gigantic water-injection project of the SACROC Unit is now under way. Water is going into Kelly-Snyder field at the rate of approximately 140,000 bbl. per day through 53 injection wells. The SACROC Unit represents the biggest field ever unitized for pressure maintenance and secondary recovery. From over 50,000 acres in the unit will be produced some 795,000,-

TREATING PLANT at Station No. 3 in the south end of the unit feeds a low-pressure system for water distribution to the high-pressure injection stations. Fig. 2.

000 bbl. of additional oil, as a result of water and gas injection, over and above 667,000,000 bbl. by primary methods.

The injection wells, as shown by the map in Fig. 1, lie on a line that divides the field roughly in half. The unit divided Kelly-Snyder field into three parts called segments, for operational purposes. Segment operators of SACROC Unit are: Standard Oil Co. of Texas, Segment No. 1; Magnolia Petroleum Co., Segment No. 2; and Sun Oil Co., Segment No. 3.

The Texas Railroad Commission used the line formed by the injection wells to divide each segment into two parts, called sectors. Allowables may be transferred within the boundaries of each sector only, but no allowable may be transferred across a sector or segment line. To date, 162 producing wells have been closed in. Allowables from these wells and from the 53 injection wells have been transferred.

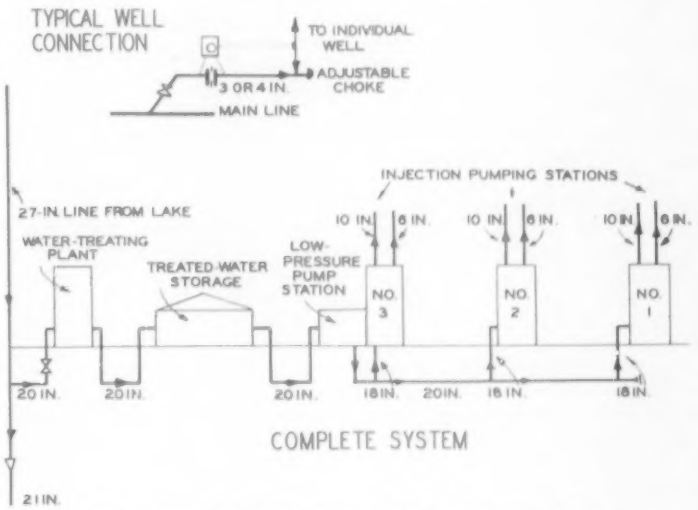
Converting to injection . . . All the wells presently used for injection were formerly producers; they were converted into injection wells after the unit went into operation. To convert the producers into injection wells required deepening them to just above the oil-water contact and perforating casing to open the full section of reef. In some cases the formation was acidized, but this was not always necessary.

Water-injection wells have no tubing.

Each well has a meter to record the volume and pressure of water injected. The wells are individually controlled to inject the amount of water required by the reservoir in that particular area.

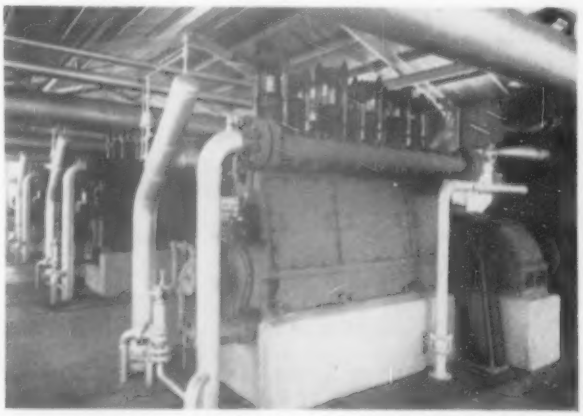
Injection Stations

Injection water for SACROC is pumped by three identical pump stations. As Fig. 1 shows, Station 1 is



SCHEMATIC DIAGRAM of water distribution system. Fig. 3.

INJECTION STATION 2 located near the center of the unit uses four high-pressure units. Fig. 4.



FOUR VERTICAL SEPTUPLEX pumps are used in each of the high-pressure injection stations. Fig. 5.

WASTE WATER from Snyder gasoline plant is filtered and delivered to two injection wells in the unit. Fig. 6.

in the north end of the unit, Station 2 is in the middle, and Station 3 is in the south end. Beginning at Station 3, shown in Fig. 2 a low-pressure system takes water from the water-treating plant at Station 3 and distributes it to the high-pressure injection stations. Fig. 3 shows the system, and Fig. 4 shows Injection Station 2.

Each of the three high-pressure stations has four 737-hp. engines driving a like number of vertical septuplex pumps (see Fig. 5). With 3¾-in. bore and 6-in. stroke, each of these high-pressure pumps can deliver 19,500 bbl. of water per day at a maximum of 1,850 psi. And, with 3¼-in. bore (by changing liners), each pump can deliver 15,000 bbl. of water per day at a maximum of 2,340 psi. They take suction from the low-pressure system which has an average of 135 psi. operating pressure at Station 3.

All fresh water injected by the unit comes from these three stations. Two injection wells receive treated salt water from a nearby gasoline plant, which otherwise would have to provide disposal facilities (see Fig. 6).

The low-pressure system at Station 3 contains two 490-hp. engines driving centrifugal pumps capable of delivering 160,000 bbl. of water per day each at 135 psi. (see Fig. 7).

Water lines . . . Reinforced-concrete line carries the low-pressure water. From Station 3 to Station 2 it is 20-in. diameter; from Station 2 to Station 1 it is 18-in. diameter.

Injection lines are high-pressure steel pipe in various sizes from 10 in. down to 3 in. as required in the main line, with 2 or 3-in. used as "lead" lines to each injection well. All of the buried steel pipe in the water system is coated and wrapped, but no internal protection has been used.

There are corrosion sleeves and coupons installed in the high-pressure lines to detect the first evidence of corrosion. Moreover, daily samples of water are being taken at the injection wells and analyzed.

Water Treating

Water pumped into all SACROC injection wells except two wells noted above is 100 per cent fresh water. Later as the flood progresses and large quantities of water are produced with the oil, produced water will also be injected. SACROC is buying water from the Colorado River Municipal Water District.

The water district pumps water from Lake Thomas through 15 miles of 27-in. concrete line to SACROC'S treating plant. The same line also serves the city of Snyder and other customers.

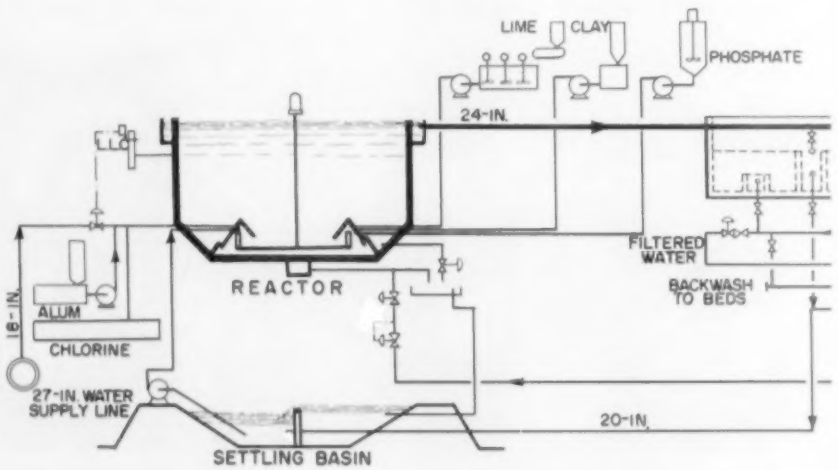
The treating plant itself has three main parts as shown in Fig. 8.

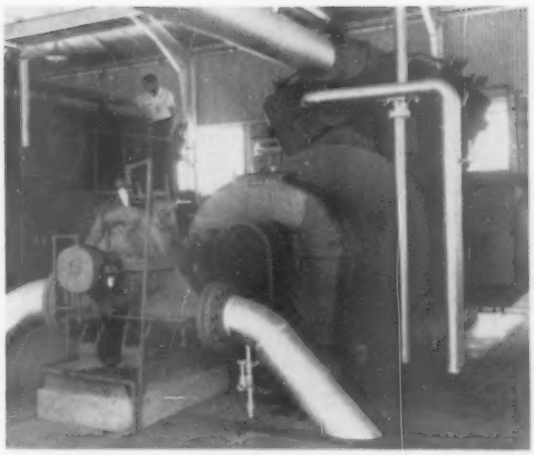
1. A 72-ft.-diameter reactor to remove suspended matter.
2. Three gravity-type sand and gravel filters.
3. A 10,000-bbl. treated-water storage tank.

At present, the surge capacity of the treating plant is only a 10,000-bbl. tank for treated water. This represents about 1 hour of operation at full capacity. However, the water district, with SACROC unit participation, plans to build a 350,000-bbl. raw-water surge tank. It will be between the plant and the city of Snyder at an elevation which will maintain a head of about 75 ft. over the plant inlet. This will provide surge capacity and represent a reserve for about 2 days of capacity operation.

The treating-plant operator (there is only one per tour) has radio contact with the water district's pump station at the lake and telephone communication with the injection stations. This close contact makes it possible to adjust operations at any point to meet sudden changes elsewhere.

First treatment, the reactor . . . Immediately as the raw water enters the treating plant, alum and chlorine are added to it. The alum, about 1 grain per gallon, is a flocculent. The chlorine is, of course, a bactericide; it is also added to the water after it leaves the filters to bring the residual chlorine content to the desired amount, as determined by operation.





LOW-PRESSURE SYSTEM at Station 3 can deliver 320,000 bbl. of water per day at 135 psi. Fig. 7.

TREATED WATER has pH of 8.4. Lime is added to the water in the reactor shown here to reach this value. Fig. 9.

Lime is added to the water in the reactor, shown in Fig. 9, to maintain a pH of 8.4 and to stabilize the alkalinity. The lime also reacts with alum to form an aluminum hydroxide floc. This coagulates the suspended solid matter which then is held in suspension near the bottom to aid continued coagulation and clarification. An automatic drawoff keeps sludge at proper level.

When SACROC began injection operations in September 1954, the turbidity of the water received from the lake was about 300 p.p.m. It soon dropped to 30 p.p.m. Now the turbidity is as low as 4 p.p.m.

Through the filters . . . All three of the gravity-type sand and gravel filters in the treating plant are on stream except when one is being backwashed. It takes about 1 hour to run a filter through its backwash cycle, and each is presently backwashed once every 2 days.

There are instruments on a central control board to show the pressure drop across each filter. This pressure drop tells the operator when the filter needs backwashing. When the filters are clean only about 2 ft. of head is lost; when they are in need of backwash, the loss is about 8 ft.

A phosphate, about 5 p.p.m., is added to the water immediately after it is filtered. This material stabilizes the alkalinity over the range of temperature filtered from the plant to the formation (from 60° to 130° F.).

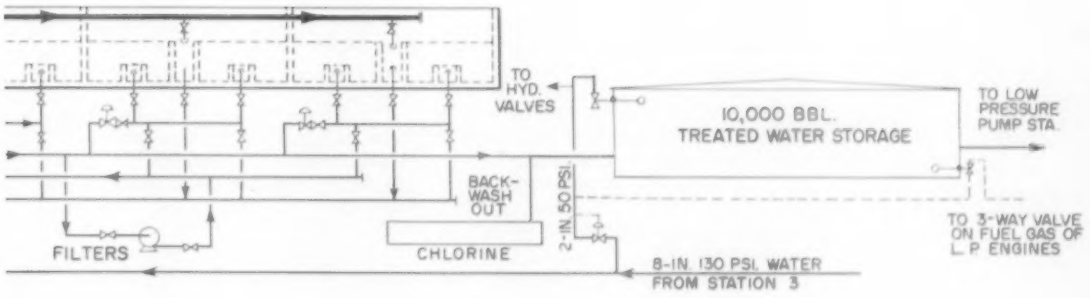
Into storage . . . Filtered water flows into the storage tank as seen in Fig. 10. The only pumps needed are backwash and sump pumps. When the water reaches the storage tank it has this analysis:

pH	8.4
Alkalinity, p.p.m.	115 to 116
Turbidity, p.p.m.	0.0
Iron content, p.p.m.	0.1 to 0.0

The Canyon Reef into which the water is injected is, of course, a calcareous formation. Therefore, the injected water must be balanced in its calcium carbonate content. Otherwise, there might be some precipitation of the calcium carbonate after the water reaches the formation.

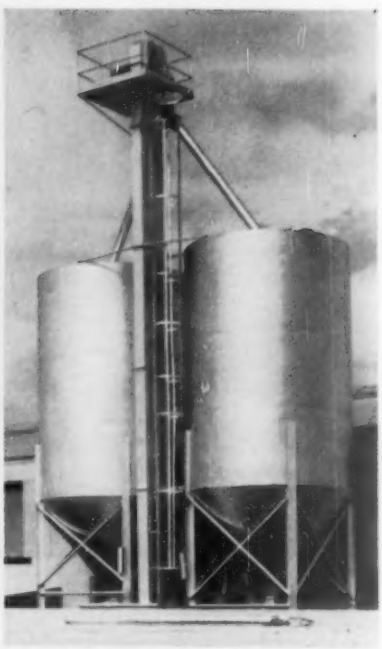
Raw water into the plant has a pH of about 8.1 to 8.5 and it is adjusted to 8.4 to minimize corrosion of injection lines, well casing, etc.

Backwashing operations . . . Backwashing of the filters is semiautomatic; the operator has only to push a button on the control board to start the operation. Everything else is done by a time-controlled system of cams operating hydraulic valves. Backwash water comes out of the treated-water storage tank and is circulated by an electrically powered centrifugal pump. The electricity is purchased, but the treating plant has a standby engine-driven generator which


TO HYD. VALVES
10,000 BBL. TREATED WATER STORAGE
TO LOW PRESSURE PUMP STA.
BACK-WASH OUT
2-IN. 50 PSI
TO 3-WAY VALVE ON FUEL GAS OF L.P. ENGINES
FILTERS
CHLORINE
8-IN. 130 PSI WATER FROM STATION 3

SCHEMATIC DIAGRAM for SACROC water treating plant. Fig. 8.

FILTERED WATER from treating system flows into the water storage tank. Fig. 10.



STORAGE BINS for handling chemicals used in water treating. Fig. 11.

can operate the entire plant except for backwash of the filters.

Water is conserved, although it is handled in big quantities. The water from the backwash operations and the sludge drawn from the reactor are drained into surface pits. Water decanted off these pits is then picked up by electrically driven pumps and returned to the reactor. In this way, only the water that evaporates to the air or seeps into the ground is lost.

Chemical handling . . . The work of adding treating chemicals is kept down by mechanized handling. Bulk lime or alum arrives at the plant on a truck and is dumped into a hopper. A bucket elevator carries the chemical up into tall storage bins shown in Fig. 11. Then a screw conveyor moves it from this storage into the feeding hopper. A level indicator on the hopper turns the screw conveyor on and off automatically to keep a constant level in the feeding hopper.

The lime in the storage bin is quick lime. It is slaked and added to the reactor in a slurry form.

Chlorine is fed from 1-ton cylinders under pressure.

The phosphate comes in 100-lb. sacks. Since it is not stable in the concentrated form, it is made up in solution to last 24 hours.

With the exception of the chlorine, all treating chemicals are proportioned to volume of water used by automatic controls governed by a meter in the influent water line. Each time that 4,350 gal. of water passes the meter, a timer starts the chemical feeders so that a predetermined amount of each chemical is added to the water. Then the timer shuts off until another 4,350 gal. passes.

Chlorine feeds into the water at a preset, steady rate.

Automatic controls . . . There are automatic controls in the injection stations and in the treating plant to guard against failure which might destroy major equipment and to regulate the flow of water. In the injection stations, each engine is fitted with controls to shut it down in case of high outlet pressure, low inlet pressure, high jacket-water temperature, low oil pressure in either engine or pump, or overspeed of the engine.

In addition, Station 3 has a control on the treated-water storage tank to shut off the gas from the engines on the low-pressure pumps in case of low water level, which in turn shuts down injection stations. With this exception, the controls are identical in the three injection stations.

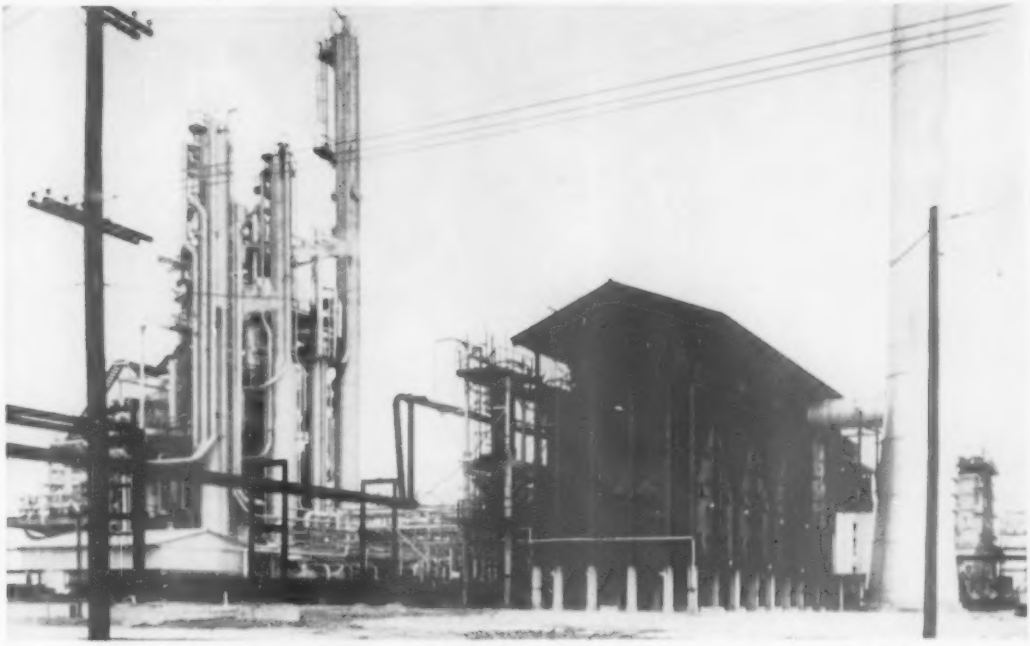
Throttle engines . . . The engines driving the high-pressure pumps have throttling controls actuated by either low suction pressure or high discharge pressure. In both cases, the engines are throttled to the minimum operating speed of 250 r.p.m. If the pressure continues to drop, the engines begin to shut down, one at a time, until satisfactory pressures are maintained with only part of the engines running or all engines are shut down.

The chain of automatic controls in the treating plant is governed by the water level in the treated-water storage tank. If the water level in this tank is too high, a level control puts back pressure on the rate-of-flow controllers on the outlets of the individual filters. This back pressure causes the controllers to throttle the water flow. Then, as the filters begin to fill up, the reactor also begins to fill up because the filters and reactor operate on the same level; the flow between them is by gravity. As the reactor fills up, a level controller throttles the butterfly valve on the raw-water line coming into the plant. Then, by a series of steps, the water level in the treated-water storage tank controls the amount of water coming into the plant.

Acknowledgment

The author wishes to thank H. H. Allen, SACROC unit manager; R. F. Weeter, chemical engineer, and other members of the SACROC unit organization for assistance in preparing this article.

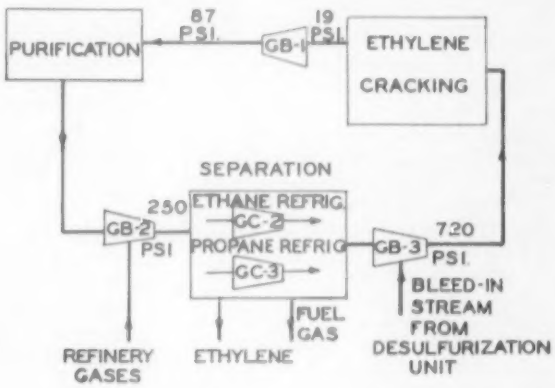
"There are automatic controls in the injection stations and in the treating plant to guard agains failure which might destroy major equipment and to regulate the flow of water."



GENERAL VIEW of the Gulf ethylene plant, first to deliver its products to customers by pipeline.

At Gulf's Port Arthur ethylene plant

Centrifugal Compressors Operate With Bleed-in Loads and Water Injection



HIGH-CAPACITY centrifugal compressors driven at high rotative speeds by steam turbines—these are vital to the operation of the large ethylene plant at Gulf Oil Corp.'s Port Arthur, Tex., refinery.

Here is one of the country's largest single installations of steam-turbine-driven centrifugal compressors. Five steam turbines and one gas expander provide a total of 19,850 hp. to drive the five centrifugal compressors. Rotative speeds range from 5,580 to 9,140 r.p.m.

Practices ordinarily not encountered in gas compression include the use of:

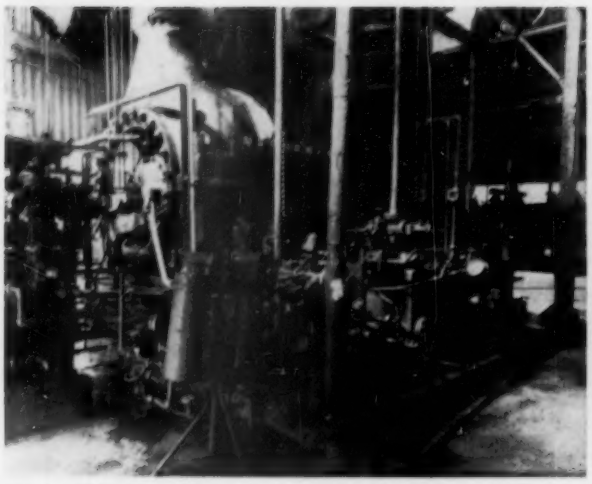
1. Centrifugal compressors for charge gas compression.
2. Water injection for cooling to prevent copolymerization.
3. Multinozzle single-casing compressors to accommodate large bleed-in loads at pressure between initial suction and final discharge levels.

Ethylene plant . . . Gulf's ethylene operation comprises these main steps: (1) cracking to make ethylene, (2) purification, (3) separation. The stream from the cracking section contains ethylene, ethane, and other components. This cracking furnace effluent goes through the purification section. Here CO_2 and sulfur compounds are removed. Acetylene and water are also removed.

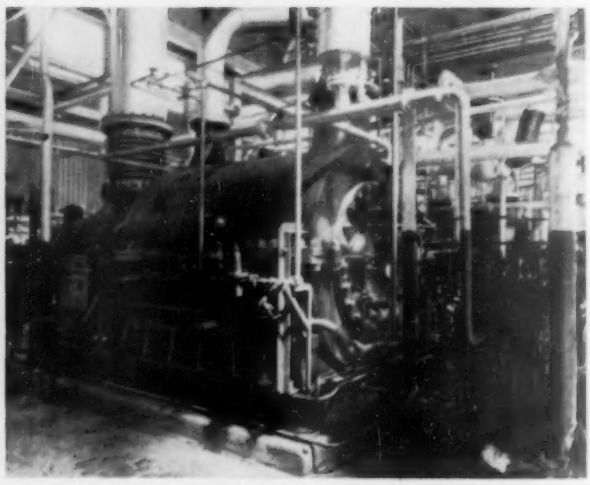
The stream is now combined with refinery cracked gases containing ethylene and ethane. The combined material enters the separation section. Basic function of this section is to separate the mixture into ethylene, ethane, propylene, propane, etc. This is accomplished in low-temperature fractionation. Cascade refrigeration is used. The ethane separated out is recycled back to the cracking section.

Capacity of the plant is 180,000,000 lb. of ethylene per year. This is total ethylene coming from the refinery gases and the gases resulting from the cracking of the ethane. The figure given is the design value based on 330 operating days per year. On a volume basis the capacity is close to 2½ billion cubic feet annually. Construction is now under way to expand this by another 3 billion cubic feet per year. More on the Gulf ethylene plant has been given elsewhere *(The Oil and Gas Journal, August 16, 1954, page 125).*

Centrifugals . . . Compressor capacities and other operating data in the table are design values. Units GC-2 and GC-3 are refrigeration compressors employed in the separation section. A



THIS COMPRESSOR, used for propane refrigeration, is the largest unit in Gulf's ethylene plant. It is steam-turbine driven.



CHARGE-GAS COMPRESSOR uses water-injection nozzles to control temperature and prevent copolymerization during compression.

closed refrigeration system using propane as the refrigerant operates at three different cooling levels, minus 10° F., plus 18° F., and 49° F. In this system the propane is recycled and condensed against water. GC-3 is the propane compressor. The ethane system is of the open type using ethane as the refrigerant and then rejecting it to the process. GC-2 is the ethane compressor.

Light hydrocarbon charge gas streams are handled by the remaining compressors. Furnace effluent is compressed from 19 to 250 psig. in GB-1 and GB-2. The latter compressor is driven by a turbine and expander. At the 250-psig. pressure level, the desulfurized and carbon dioxide-free refinery gases are added to the compressed furnace effluent gas. The combined gases are finally compressed to 720 psig. by compressor GB-3. This compressor also takes a bleed-in stream from a desulfurization unit located approximately 2 miles from the ethylene plant.

Bleed-in . . . The quantities noted refer to initial suction and do not include additional gas bled in at intermediate pressures. Thus, in the case of the GC-3 unit, initial suction is 93,400 lb. per hour, then a bleed-in between the first and second stage impellers of 210,610 lb. per hour and further bleed-in between the second and third stage of 118,273 lb. per hour. In the GC-2 unit, initial suction is rated at 27,930 lb. per hour with a bleed-in between the first and second stage impellers of 126,450 lb. per hour.

This illustrates the flexibility of a centrifugal compressor which can bleed in gases at varied pressures and raise them all to a single discharge pressure. Impellers and volutes for a given casing size can be arranged so that the second stage handles double the volume of the first stage and the third stage triple the volume. The twin-volute design used in this plant permits bleed-in nozzles without increasing compressor size.

Water injection . . . In the GB-1 and GB-2 units, water injection is used to cool the compressed gasses to prevent polymerization. Water is injected through spray nozzles into the volute discharge passages. Liquid injection is highly effective. Virtually all heat of compression can be removed, with saturation of the gas as the sole limiting factor.

Expander . . . The turbine-expander-compressor unit includes GB-2 and GC-1. A 2,850-cu. ft. per minute compressor is driven at 8,950 r.p.m. by both a 1,530-hp. steam turbine and a 720-hp. gas expander.

Steam to operate the turbines is supplied from a central steam-generating plant serving the entire refinery. Conditions at the turbine throttle are 210 psig. and 160° F. superheat. All units are operated condensing at 4 in. of Hg absolute. Since part of the process required a reduction in pressure for a portion of the charge gas, an expander turbine was installed to make use of some of the energy rather than resorting to a wasteful throttling process. Charge gas at 700 psig. and 20° F. is expanded to 140 psig. and minus 70° F. thus realizing 720 hp. from what would have been a wasteful expansion. Steam turbine GB-2 and the gas expander GC-1, drive one compressor, the machines being connected in tandem.

The compressors and turbines at the Gulf plant were furnished by Worthington Corp.

Centrifugal Compressors at Gulf's Ethylene Plant, Port Arthur, Tex.

DRIVER

Unit designation—	Working medium (turb.)	Turbine (hp.)	Steam rate (lb./hr.)	No. and type of turbine stages	Speed (r.p.m.)
GB-1	Steam	1,700	17,600	1 Curtiss 8 pressure	5,580
GB-2	Steam	1,530	14,000	6 pressure	8,950
GC-1	Charge gas	720	28,320	1 pressure	8,950
GB-3	Steam	5,000	47,900	6 pressure	7,890
GC-2	Steam	3,050	29,200	6 pressure	8,675
GC-3	Steam	7,850	78,500	6 pressure	5,800

COMPRESSOR

Unit designation—	Stages	Substance handled	Capacity (c.f.m.)	Pressure (psia.)	Suction temp. (°F.)	Pressure (psia.)	Discharge temp. (°F.)	Comp. (hp.)
GB-1	5	Charge gas	6,660	33.7	105	102	260	1,667
GB-2 GC-1	6	Charge gas	2,850	77.0	105	265	255	2,140
GB-3	5	Charge gas	2,050	254.7	105	735	231	4,760
GC-2	4	Ethane	920	64.0	—60	275	140	2,773
GC-3	4	Propane	5,230	30.5	—10	275	168	7,475

Fig. 1—Map of oil-producing area of North Dakota. All producing fields are in the Williston basin, precise limits of which have not been defined.

North Dakota Today . . . A Status Report

. . . with special emphasis on its sulfur-recovery facilities

by J. D. Lankford

THE only commercial source of sulfur now available in North Dakota is the solution gas from Williston basin oil fields. Signal Oil & Gas Co. is operating a sulfur-recovery plant which processes gas from 392 of the state's 423 oil wells.

● Based on a 3 per cent average H_2S content of the gas processed and a 90 per cent recovery efficiency, the proved sulfur reserves in this area are about 723,000 long tons.

● The plant is sized for recovery of 65 long tons of sulfur per day. Present production is about 33 long tons, and daily average for 1955 is expected to be some 30 long tons.

Hydrogen sulfide content of the gas ranges from a trace to a maximum of about 20 per cent. Although there is some sulfur in the crude oils (0.12 to 0.90 per cent by weight) the crude on the whole is considered to have low sulfur content. Sulfur in the oil should not be considered as a recoverable resource.

All gas produced in the oil fields of North Dakota is solution gas, gas in solution in the fluids in the underground reservoirs at the conditions of pressure and temperature of the reservoir rocks. No dry-gas or condensate wells have been discovered.

Author is assistant to chief, helium operations, U. S. Bureau of Mines, Amarillo, Tex. He was formerly chief, fuels technology division, USBM, Region V, Minneapolis.

The Williston Basin

All producing oil fields in North Dakota are in the Williston basin. This basin contains sedimentary formations that cover portions of North Dakota, South Dakota, and eastern Montana in the United States. It also extends northward into the provinces of Saskatchewan and Manitoba in Canada. The precise limits of the basin have not been defined.

In the map (Fig. 1) the generally accepted easterly limits are shown to be roughly circular. The deepest sedimentary column, estimated to be 16,000 to 20,000 ft. thick above the basement granite, is southeast of Williston, N. D., in Dunn, Mercer, and McLean counties.[1] In area, the Williston basin covers about 120,000 sq. miles; about two-thirds is in the United States and one-third in Canada.

The geology of the basin is well described in a number of publications by Dr. Wilson M. Laird,[2] North Dakota state geologist. Lindsey[1] and Goodin[3] give an excellent summary and bibliography in their publications.

Oil Production—Proved Reserves

As of November 1954, it was estimated that the proved reserves of oil in North Dakota totaled about 575 million barrels.[4] These reserves are contained in three formations: (1) Madison of Mississippian period; (2) Devonian period; and (3) Silurian period. As of December 1954, North Dakota has named 18 oil fields.[7]

During November 1954, 604,000 bbl. of oil was produced from 423 oil wells, over 95 per cent from the Madison formation in the Beaver Lodge-Tioga area in Williams, Mountrail, and McKenzie counties. All fields in this area are on highs on the Nesson anticline, the large structural trend along the synclinal axis of the Williston basin running almost due north and south in these counties. Fig. 1 is a map of North Dakota, showing the oil fields.

Beaver Lodge-Tioga Area

Two adjoining oil fields, Beaver Lodge and Tioga, are the largest oil and gas producers. Several smaller fields flanking Tioga field on the east and west have been discovered and are under development; a number of other small fields extend southward from Beaver Lodge field along the Nesson anticline. Although many of the oil fields have been given separate names, oil operators believe that eventually several fields will be found to be extensions of those discovered earlier.

According to engineers of Amerada

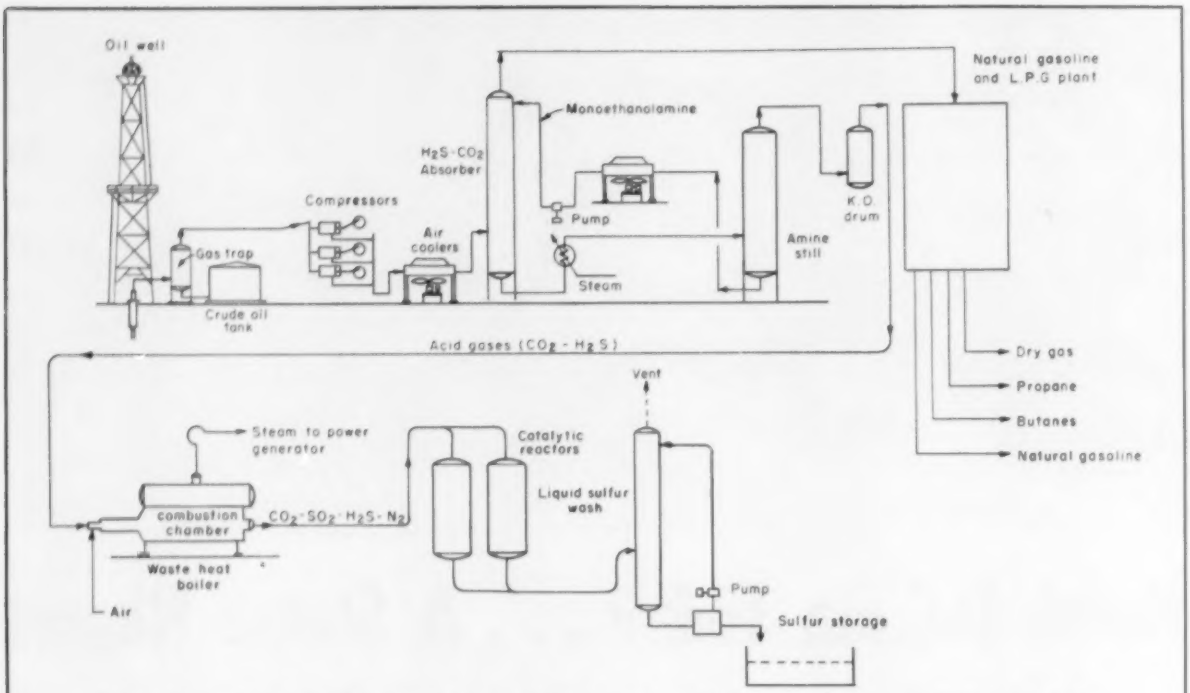


Fig. 2—Schematic flow diagram, showing sulfur-recovery process, Signal Oil & Gas Co. processing plant, Tioga, N. D.

Petroleum Corp., the largest oil operator in North Dakota, almost all oil and gas produced has been from the Madison formation. The deeper Devonian and Silurian formations in the Beaver Lodge-Tioga area, where substantial proved reserves exist, have not been explored to the extent of the Madison.

Oil Refineries—Oil-Production Rate

Lack of markets and of pipeline transportation for oil and gas has been a serious drawback to oil production in North Dakota. Consequently, the state's production has been limited by its industrial commission to an almost static monthly allotment of 14,000-15,000 bbl. per day. Thus, the production from either Beaver Lodge or Tioga field is below its maximum efficient rates of production.[8,9]

With the completion in October 1954 of the Standard Oil Co. (Ind.) 30,000-bbl. per day refinery at Mandan, N. D., and completion of crude pipelines to this refinery from the Beaver Lodge-Tioga area, an enlarged outlet for the crude has been developed.[8] Pipelines from Mandan eastward connect to existing lines to Minneapolis-St. Paul for transportation of refinery products. The production allowable for December 1954 was 21,555 bbl. per day, about the same as November,[5] and an approximate increase of 50 per cent over earlier allowable daily production rates.

As the Mandan refinery and smaller refining plants at Williston and Dickinson are brought to capacity, a daily production for the state, based on the capacity of these refineries, should exceed 33,000 bbl. However, continuing lack of pipeline transportation for crude oil and competition among refiners in neighboring states for the limited demand in the area (estimated at about 60,000 bbl. per day)[9] marketing in North Dakota and contiguous states is expected to prevent large expansion of crude-oil production in the immediate future.

Gas-Processing Plant

When it became apparent that the reserves of wet gas from the Tioga-Beaver Lodge area were substantial, Signal Oil & Gas Co. of Los Angeles contracted with the oil operators to install a natural-gasoline plant and pipelines to gather and process the wet gas.

By the terms of the contract, Signal gathers wet gas from the producers' wellhead separators for processing in its gasoline plant. Natural gasoline, sulfur, and L.P.G. are the major products of value recovered. Natural-gasoline product is batched through the crude-oil line to the Mandan refinery. Elemental sulfur is recovered from the hydrogen sulfide in an almost pure state. Title to the gas from Amerada's wells remains with Amerada. Signal has title to the gas from other producers' wells. At present all dry gas is flared.

Agreement—"Contract Area"

In Signal's agreement with the oil-producing companies, an area was outlined in which Signal would gather wet gas from the producing oil wells. This area is shown in outline in the map, Fig. 1.

Included in the "contract area" are the most prolific oil fields in North Dakota, including 392 of the state's 423 oil wells. In October 1954 this area produced 91 per cent of the oil in North Dakota and over 95 per cent of the oil and gas in the greater Beaver Lodge-Tioga area. Wells in three oil fields — Beaver Lodge, Tioga, and Capa—are connected to the Signal gas-gathering system. The largest oil producer in the contract area by far is Amerada.

Over 90 per cent of the oil and sulfur-bearing gases in the state is produced in the contract area, and the Signal plant will probably be the sole source of elemental sulfur for some time.

Site and Construction

The Signal gas-processing plant is on an 80-acre site near the center of the contract area. It is located about ¾ mile east of Tioga, Williams County. The plant was designed by J. F. Pritchard & Co., engineers and constructors of Kansas City, Mo. Brown & Root Co., Inc., of Houston, erected the plant during 1953-54. First operations were begun in October 1954.

Gas-gathering . . . About 840,000 ft. of

Fig. 3—Signal gas-processing plant near Tioga. Sulfur-recovery units are in building and equipment at left. Compressors are in building in center, and L.P.G. and natural-gasoline equipment are to right of building. Product storage and flare burning dry gas are at far right.

pipe is installed in the gas-gathering system. About 60 per cent of the pipe was in the Beaver Lodge end of the contract area. The gathering system utilizes pipelines in sizes from 2 to 34 in. Because of the extreme weather conditions, pipelines containing material subject to freezing are buried 8 ft. below the ground surface.

The Signal plant was designed for 65 million standard cubic feet of wet gas per day, which is more than twice the production of wet gas in December 1954 from wells in the Madison formation. Ample capacity is, therefore, available for expansion. A flow diagram of the plant is shown in Fig. 2 and the picture is a recent plant photograph.

About 1 long ton of sulfur should be recovered from each million cubic feet of wet gas processed. Therefore, the sulfur plant capacity is about 65 long tons per day.

Gas Analyses

Table 1 gives several analyses of typical gases from various fields; it includes analyses representing typical average wet gas entering and dry gas leaving the processing plant. These data indicate that most gas from the Madison formation in the Beaver Lodge-Tioga area is of fairly uniform quality with about 3 per cent hydrogen sulfide, although the East Tioga wells contain almost 5 per cent.

In areas outside the contract area, or not yet connected to the Signal gas system, Madison-formation natural gases show extremely wide variations in sulfur content. The average analysis of the gases from two Madison wells at Croff is 20 per cent hydrogen sulfide and the average of three Madison gas samples from Fryburg is only 0.11 per cent.

Based on a 3 per cent average H_2S content and a 90 per cent recovery efficiency, the proved sulfur reserves in this area are about about 723,000 long tons.

Gas from the Devonian formation in Beaver Lodge field as shown by the single available sample is practically sulfur free. Silurian reservoir gas, however, on the basis of one sample analysis, has about the same hydrogen sulfide content as Madison wells in this field.

Description of Plant and Process

Wet gas from the oil-gas field separators flows through the gas-gathering pipeline into the gas trap at the plant where entrained liquids, chiefly crude oil and water, are removed (see Fig. 2). Gas pressure at the compressor inlet is about 10 psi. Six three-stage compressors driven by 2,000-hp. (sea-level rating) natural-gas engines are installed for compressing the gas to plant operating

TABLE 1—APPROXIMATE AVERAGE ANALYSES OF VARIOUS GASES FROM OIL FIELDS IN NORTH DAKOTA*

Oil field and producing formation—	Reliable samples	Mole percentage						Calc. gross heating value, B.t.u./M. cu. ft. at 60° F., 14.7 psi.	Specific gravity at 60° F., 14.7 psi.
		C_1	C_2	C_3	C_4	CO_2	H_2S		
Oil-field separator wet gas:									
Tioga—Madison	2	60.38	18.02	9.54	4.53	1.05	3.25	1,401	0.850
East Tioga—Madison‡	2	57.74	15.13	11.01	4.94	2.14	4.70	1,411	0.924
Beaver Lodge—Madison	4	61.33	17.94	9.15	4.34	1.53	3.33	1,366	0.832
Capa—Madison	2	60.45	18.12	8.45	2.83	1.70	2.36	1,293	0.854
Hofflund—Madison‡	1	57.85	16.34	8.77	6.51	3.74		1,429	0.911
Charlson—Madison‡	1	61.94	18.33	9.33	5.17	1.08		1,450	0.869
White Earth—Madison†	1	64.29	15.18	10.17	3.83	2.12	2.84	1,390	0.857
Beaver Lodge—Devonian	1	67.34	17.54	8.38	3.16	0.62	Trace	1,374	0.812
Beaver Lodge—Silurian	1	81.26	6.53	3.25	2.07	0.70	2.98	1,170	0.717
Croff—Madison‡	2	58.13	13.88	7.44	4.51	2.25	20.00	1,433	0.880
Fryburg—Madison	3	47.26	21.78	14.76	8.34	1.91	0.11	1,698	1.047
Signal Oil Co. gas processing plant gases:									
Plant feed (design basis)†		59.84	17.10	10.20	4.87	1.313	2.947		
Plant feed (actual—daily composite 10-23-54)§		59.05	18.29	10.17	4.69	2.97	2.85	1,439	0.901
Dry plant tail gas¶		80.23	16.12	1.38	0.13	0	0	1,138	0.659

*All data not otherwise noted supplied by Amerada Petroleum Corp. †Data supplied by Signal Oil & Gas Co. ‡Not connected to Signal plant at present. §Data supplied by Signal Oil & Gas Co. This sample was a composite of the plant feed for October 23, 1954, and represented 80 per cent of the wells in Tioga field and 60 per cent in Beaver Lodge field. ¶Data supplied by North Dakota Natural Gas Transmission Co.

pressures and provision has been made to install two more compressors later when needed. Gas from the first compression stage, at about 60 psi., enters the amine absorber and passes countercurrent to a stream of 20 per cent monoethanolamine-water solution.

The amine solution absorbs the acid gases, H_2S and CO_2 from the hydrocarbon gases. Sweet gas is compressed to 500-750 psi. and sent to natural-gasoline processing units of conventional design. Natural gasoline and L.P.G. are removed, refined, and delivered to storage for sale.

The "fat" amine solution containing the carbon dioxide and hydrogen sulfide pass to an amine still where the acid gases are removed overhead and "lean" amine solution is removed from the bottom and recycled, after cooling, to the amine absorber. Acid gases then are burned in a waste-heat boiler using a controlled amount of air. These stoichiometric proportions are used:

$$2H_2S + SO_2 = 3S + 2H_2O$$

This reaction is carried out in the presence of a catalyst in the reactors following the waste-heat boiler.

At the temperature of the reactors, elemental sulfur resulting from the reaction is vaporized. The stream from the reactor, containing sulfur vapors, water vapor, carbon dioxide, nitrogen and traces of hydrocarbon gases, is passed countercurrent to a stream of molten sulfur to strip and condense the sulfur vapors.

The stripped gas is vented, and molten sulfur is withdrawn constantly from the bottom of the sulfur wash vessel and pumped to storage. The sulfur is allowed to cool in forms. When the forms are filled they are removed; the sulfur is broken by blasting and then loaded into railroad cars for shipment.

The sulfur-recovery unit was started up on December 20. Operation is going smoothly, and has been maintained at plant gas feed rates as low as 15 M.M.c.f.d.

Crude-oil-production rates have recently been increased to supply the new refineries in North Dakota, and the Signal plant throughput is about 33 million standard cubic feet of wet gas per day. Sulfur recovery is now about 33 long tons per day, and the plant should average about 30 long tons per day throughout 1955.

Utilities . . . Water supply is limited and and presents a major problem. Air-cooled condensers and coolers using forced-draft fans have been used exclusively on all process streams. Most of the electrical supply for the plant is provided by gas-engine-driven generators. When the sulfur plant is in operation, steam from the waste-heat boiler, fired by acid gases, will be used to drive a steam turbine to generate part of the power supply.

Marketing Dry Gas

As shown in Table 1, dry gas from the Signal plant is of excellent quality. North Dakota Gas Transmission Co., St. Paul, applied to state authorities for a certificate of public convenience and necessity to construct a line across the state to serve several of the larger towns and industrial users.

The certificate was not granted and hearings still are pending on other applications. Northern Natural applied for a certificate to construct a natural-gas line to tie in the Tioga plant with its existing lines from the Southwest now supplying the Twin Cities. Its proposal is also to connect to the Trans-Canada pipeline and thereby achieve an integrated pipeline network having multiple sources of supply.

Natural-Gas Reserves

Based on estimates by Keplinger and Wanenmacher,[10] the proved reserves of natural gas in the area served by the Signal gas-processing plant at Tioga are given in Table 2.

TABLE 2
Approximate Proved Gas Reserves of Beaver Lodge-Tioga Area as of January 1954[10]

	Billion Standard cubic feet	
	Dry gas*	Wet gas*
Madison formation:		
Beaver Lodge	187	265
Tioga	110	156
Charlson-Hofflund	40	57
Devonian formation:		
Beaver Lodge	68	107
Silurian formation:		
Beaver Lodge	196	280
Total	601	865

*"Dry gas" is computed as pipeline gas available after "wet gas" has been processed at Signal's Tioga plant.

According to more recent data from the North Dakota Geological Survey[5] and interviews with engineers of Amerada and Signal, these estimates of gas reserves are conservative because exploration to determine extent of the reservoirs is incomplete. This is especially true of the Devonian and Silurian formation reservoirs where data are available from only a few wells.

Acknowledgments

This report was prepared under the general supervision of M. E. Volin, regional director, Region V, and R. A. Cattell, chief, Division of Petroleum, Bureau of Mines, Washington, D. C.

Particularly helpful in supplying data, maps, and illustrations and reviewing the manuscript were Lloyd C. Miller, chief engineer, Signal Oil & Gas Co., Williston, N. D., and H. A. Nedom, district petroleum engineer, Amerada Petroleum Corp., Williston, N. D. Dr. Alex C. Burr, director, North Dakota Research Foundation, and Dr. Wilson M. Laird, North Dakota state geologist, both were very cooperative in furnishing data and assistance.

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BOOK

INTERPRETATION OF ENGINEERING DATA: SOME OBSERVATIONS. By Harold F. Dodge. Published by the American Society for Testing Materials, 1916 Race Street, Philadelphia 3. 36 pp., $1.50.

This booklet offers an excellent presentation of the basic ideas behind a relatively new and most promising engineering field—quality engineering. It will make fascinating and highly profitable reading for both engineers and statisticians interested in applying statistical analysis and interpretation to engineering data.

The excellence of this paper comes naturally. It's the publication of the 1954 Edward Marburg Lecture delivered at the A.S.T.M.'s 1954 annual meeting. As such, it's an outstanding piece of work written by a leader in his field. That leader, in this case, is Harold Dodge — an authority on statistical quality control.

Dodge's basic premise is that "most engineering data on the quality of materials or manufactured products can be looked upon as (statistical) samples—samples of information with respect to either (a) the product already made, or (b) the underlying cause system behind the data." With these samples in hand, the author explains—in easy-to-read detail and with working formulas—how these samples can be interpreted both to maintain high quality of products being manufactured and to predict the quality level of future operations.

In short, here is a little booklet with a wealth of big ideas.

Tests with Australian tannin impress researchers with its value in compounding

An Improved Emulsion-Oil System

For three principal reasons . . .

(1) Ease of dispersion in cold water. (2) Emulsifying ability. (3) Efficiency as a gel and viscosity reducer for emulsion muds

by H. M. Barrett

TWO materials which have special properties useful in compounding and controlling oil-in-water-type emulsion-mud systems are Australian tannin and high-aniline-point oil.

The Australian tannin controls the viscosities and gel strengths of emulsion muds more effectively than does Argentine quebracho.

The high-aniline-point oil disperses well into oil-in-water emulsions. It does not mask the odor or stain of formation oil, and it does not cause increase in rubber deterioration over that caused by water-base muds.

Oil-water mud . . . Any good water-base mud can be used as a base for compounding an oil-in-water-type emulsion mud. It should be free of excessive amounts of contaminating salts and have average good mud properties. The properties of the water-base mud materially affect the properties of the emulsion produced by its use.

The addition of oil to a mud will reduce its water loss about 40 per cent. The viscosity will be increased and the gels may or may not change. These gels and viscosities are controlled by the same chemicals used for treating the water-base mud. Many chemical combinations are used but the one material common to almost all of them is a tannin.

There are many tannins and at one time or another all of them have been tested in drilling muds. The standard material, however, has remained the Argentine quebracho. Until recently, none of the other tannins tested have approached the Argentine product in all-around ability as a mud additive and only seldom did they equal or surpass it even for special applications.

Because of reasons of economy, there has been a decided trend towards the compounding of less efficient and cheaper materials with the pure quebracho. At the present time there is actually very little pure quebracho being sold for use in drilling muds. When the pure product is purchased by an operator, he must pay a premium above the established price for the quebracho compounds.

Author is with Phillips Petroleum Co., Oklahoma City. Paper presented at A.P.I. meeting, Amarillo, Tex., March 23-25, 1955.

Australian Tannin

While searching for an improved tannin, any special characteristics of a material being tested must be carefully considered to determine whether this special characteristic can be used to perform a particular mud job. During the testing of Australian tannin, such special characteristics became evident and as a result of them more specialized testing was done with this material. The three special characteristics of this material were:

1. Its ease of dispersion into cold water.
2. Its emulsifying ability.
3. Its great efficiency as a gel and viscosity reducer for emulsion muds.

It also was found to be a good all-around tannin material. It had been used extensively in other industries and had been used in limited quantities in drilling muds in Canada.

No special test was devised to show its fast dispersion in cold water. The phenomenon was noted in the laboratory, and in the field it was observed that chemical tanks used for mixing caustic and quebracho almost always had a residue of gum-like insoluble quebracho which had to be shoveled to the reserve pit at intervals. When Australian tannin was used, no residue was left and less stirring was necessary.

The laboratory test that indicated that Australian tannin aided in the formation of a more stable emulsion is a screening test for quick evaluation of emulsifiers. To a 20 per cent diesel oil and water mixture is added calcium chloride. The material to be tested is then added, the mixture stirred, poured into a glass graduate, and allowed to separate. The slower the separation, the more effective is the emulsifier.

This quality in a thinner is of some value, but unless the material is used primarily as an emulsifier it is not of extreme importance. In a mud system containing a proper amount of Driscose, tall oil, lignite, or special surfactants as emulsifiers, the action of Australian tannin is not discernible.

Viscosity and gel control . . . The characteristic of the material which we are most interested in is its ability to reduce gels and viscosity in drilling muds which contain oil. In this respect it excels pure Argentine quebracho and

TABLE I—AUSTRALIAN TANNIN AND ARGENTINE QUEBRACHO AS EMULSIFIERS
(Base mud: 20 per cent diesel oil in water with 10 lb. per bbl. calcium chloride added)

Material—	Amount added (lb./bbl.)	Stirring time (min.)	Standing time (min.)	Water (ml.)	Oil	Emulsion (ml.)	Foam (ml.)
Australian tannin	1	2	5	1	0	0	525
Australian tannin	1	2	10	5	0	275	250
Australian tannin	1	2	20	25	0	275	225
Australian tannin	1	2	30	50	0	250	225
Argentine quebracho	1	2	5	16	0	0	575
Argentine quebracho	1	2	10	25	0	175	375
Argentine quebracho	1	2	20	50	0	175	350
Argentine quebracho	1	2	30	90	0	160	325

was better than any of the compounds made from Argentine quebracho which were tested. Table 2 contains the results of a competitive test with quebracho. The resultant emulsion mud had a viscosity of a 10-minute gel strength less than half as great as did the mud treated with the pure quebracho.

Later tests substantiated this trend although the amount of improvement did not remain this great. Laboratory testing with actual field muds gave added evidence that Australian tannin has a special facility for controlling emulsion muds. In Table 3 are the results obtained by comparing Australian tannin with other tannins as viscosity and gel reducers of field muds to which diesel oil was added.

These tests with field muds indicated that a well test should be made. The material was used in drilling the 1 Cecelia well in Southwest Panther Creek. It performed well and has been in regular use for over a year. It has been particularly useful in Oklahoma during the present dry weather which has caused most water sources to be contaminated with more than the usual amount of soluble salts. A more efficient chemical treatment also aids in dispersing the increased amounts of solids being introduced into mud systems by the jet-bit drilling now being done. The high-horsepower pumps handling large volumes of mud at high velocities make mud treating increasingly difficult.

"Laboratory testing with actual field muds gave added evidence that Australian tannin has a special facility for controlling emulsion muds."

High-Aniline-Point Oil

Several of the disadvantages most often cited[1] when oil-emulsion muds are considered result directly from the type of oil used. These disadvantages are: (1) Interference with geologic interpretation by masking color and odor, (2) fire hazard, and (3) deterioration of rubber exposed to emulsion mud.

In addition to overcoming these disadvantages, a special emulsion oil should offer other desirable characteristics such as (1) uniformity, (2) easy emulsification, (3) improved lubrication, and (4) no waste.

The manufacture of such an oil begins with the proper selection of crude stock and progresses to an exact fractionation of the best product of this crude already available in quantity. An oil having comparatively narrow boiling range and high-aniline point was chosen. Such an oil has no waste from either the loss of light fractions to the atmosphere or of heavy fractions over the shale shaker.

The high-aniline point indicated that this oil would not injure rubber rig equipment with which is comes in contact. The rapid deterioration of rubber pump parts, hoses, casing protectors, and blowout preventer rubbers has increased the cost of using emulsion muds. The speed of this attack depends upon the emulsion oil that is used. Not many accurate records are kept of this loss and few companies know how long these rubber parts should last.

A recent experience brought this cost to the attention of Phillips Petroleum Co., however, when the new pipe-protector rubbers on 10,000 ft. of drill pipe were found to be ruined after being exposed to the oil in an emulsion mud for less than 2 weeks. This was a loss of approximately $4,000.

Field tests confirmed the belief that the high-aniline-point oil would not injure rubber rig equipment.

General Performance

The well chosen for a test of this high-aniline-point oil was the 1 Steve well in Grady County, Oklahoma. It was a deep well, more than the minimum amount of geological information was needed from it, and a nearby well could serve as a standard for comparisons. No difficulty was experienced in either case. Australian tannin was used in the chemical treatment of each of these muds. The emulsifier used in each was Driscose. This material also reduced the water loss and stabilized the mud properties of each system.

TABLE 2—EFFECT OF QUEBRACHO AND AUSTRALIAN TANNIN ON A LABORATORY MUD CONTAINING 15 PER CENT DIESEL OIL

				A.P.I. RP 29[4] properties			
	Per cent oil	Amount tannin (lb./bbl.)	Amount caustic (lb./bbl.)	Stormer viscosity (cp.)	Stormer gels (g.)	Water loss (ml.)	Filter cake (in.)
Base mud	0	0	0	41	20-65	10.8	5/32
Argentine quebracho	15	1	1	88	0-60	5.6	3/32
Australian tannin	15	1	1	41	0-25	5.6	3/32

TABLE 3—EFFECT OF SEVERAL TANNINS ON FIELD MUDS CONVERTED TO EMULSIONS

Description—	Amount tannin added	Amount caustic added	Total oil (per cent)	A.P.I. RP 29 properties— Stormer viscosity (cp.)	Gels (g.)	Water loss (ml.)
Field Mud No. 1, East Purdy Pool, Oklahoma						
As received	0	0	3.45	15.5	0-40	7.0
Added oil	0	0	15	20	0-55	5.8
Australian tannin	1	1	15	21.5	0-55	4.5
Argentine quebracho	1	1	15	31.5	2-55	4.9
Tannin A	1	1	15	28	0-60	4.5
Tannin B	1	1	15	33	2-85	4.6
Field Mud No. 2, County Line, Oklahoma						
As received	0	0	2.5	21.5	0-1	6.6
Added oil	0	0	15	36	0-2	4.9
Australian tannin	1	1	15	24	0-15	4.2
Argentine quebracho	1	1	15	29	0-40	3.5
Tannin A	1	1	15	31	0-40	3.8
Tannin B	1	1	15	28	0-32	3.4
Field Mud No. 3, Doyle Pool, Oklahoma						
As received	0	0	0	51.5	70-70	46.0
Added oil	0	0	15	66.5	115-110	26.0
Australian tannin	1	1	15	47.0	75-80	25.0
Argentine quebracho	1	1	15	15.0	17-40	18.0
Tannin A	1	1	15	66.5	110-105	24.5
Tannin B	1	1	15	37.5	60-65	21.0
Field Mud No. 4, Chocolate Bayou Pool, Texas						
As received	0	0	0	42	0-10	3.0
Added oil	0	0	15	61	0-10	1.8
Australian tannin	1	1	15	43	0-5	1.6
Argentine quebracho	1	1	15	42	0-5	1.2
Tannin A	1	1	15	45	0-5	1.3
Tannin B	1	1	15	47	0-10	1.1

Note: Original paper had 11 tables on field-mud tests.

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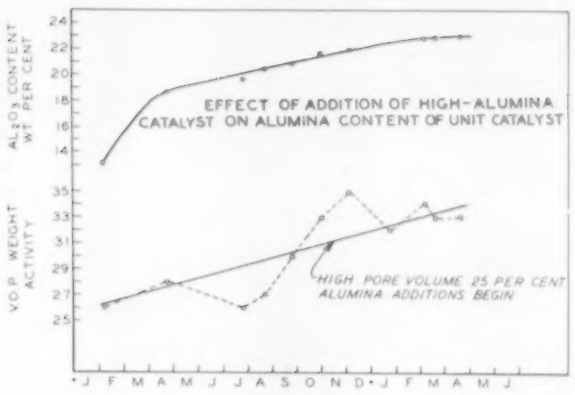

EFFECT OF ADDITION OF HIGH-ALUMINA CATALYST ON ALUMINA CONTENT OF UNIT CATALYST
Al2O3 CONTENT WT PER CENT
V.O.P. WEIGHT ACTIVITY
HIGH PORE VOLUME 25 PER CENT ALUMINA ADDITIONS BEGIN
J F M A M J J A S O N D J F M A M J

Fig. 1.

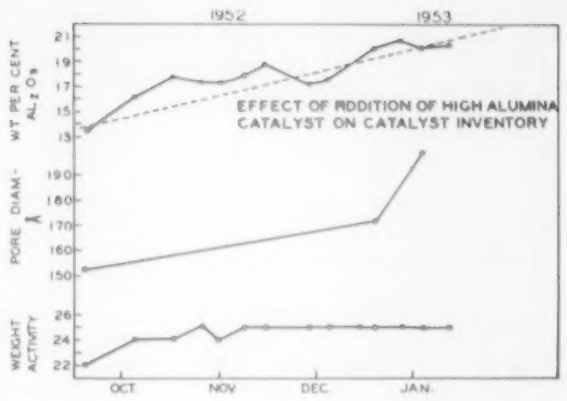


Fig. 2.

Have You Tried High-Alumina Catalyst?

It's more stable, cracking selectivity is better, stack loss is lower

by B. H. Loper

HIGH-ALUMINA catalyst offers several advantages to recommend its use in units using fluid cracking catalyst.

- The prime advantage is that of greater activity stability. Therefore, a given level could be maintained with a lower catalyst makeup rate.

For a given catalyst usage, a higher activity level could be obtained with 25 per cent alumina cracking catalyst than with 13 per cent alumina catalyst. And at the same time, the high-alumina catalyst will permit selectivity improvements by operation at lower temperatures in units that are activity limited.

- With some feed stocks, tests have shown an improved cracking selectivity for the 25 per cent alumina catalyst.
- Another advantage to be expected is that a lower stack loss will result from the use of 25 per cent alumina catalyst. If catalyst usage is dictated by stack loss only, this will, in effect, reduce catalyst usage.

If a withdrawal program is in use, these lower losses will allow greater metal contaminants removal at the same catalyst usage. Such removal improves selectivity and will result in an improved product distribution.

Basically, the refiner will be getting more useful liquid products per pound of catalyst used.

Commercial trial . . . A trial run of the 25 per cent alumina catalyst was made at the Houston refinery of Shell Oil Co., beginning on February 12, 1952. The high-alumina catalyst was added to the plant inventory containing low-alumina catalyst. This unit carries a circulating catalyst inventory of 650 to 700 tons and has a nominal feed rate of 36,000 bbl. per day.

Of the "down-flow" type, the unit is a Shell Oil Co. design but is somewhat similar to a Kellogg balanced-pressure unit. Fresh catalyst is added to the reactor in an oil slurry. The regenerator is equipped with two-stage cyclone for catalyst collection.

Prior to the trial of high alumina, the unit had been charging 13 per cent alumina catalyst. The particle-size distribution of the high-alumina catalyst used in the trial is compared to the low-alumina catalyst in Table 1.

TABLE 1—PARTICLE SIZE COMPARISON OF CATALYSTS

	High alumina	13 per cent alumina
Per cent less than 150 μ	96	97
Per cent less than 100 μ	78	82
Per cent less than 80 μ	64	66
Per cent less than 74 μ	58	60
Per cent less than 40 μ	25	13
Per cent less than 20 μ	7	3
Average particle size, μ	66	67

During the test, all conditions were held as nearly constant as is possible in commercial operations, except for the catalyst changeover. Catalyst addition rate was held as near 10 tons per day as was possible.

On this basis, addition rate varied from 1.33-1.53 per cent of inventory per day because any increase of the equilibrium catalyst activity was utilized by reducing the reactor inventory to keep conversion constant.

360-day run . . . During the trial run, the unit was shut down several times due to mechanical troubles, but at no time due to trouble relating to the catalyst. When the trial was ended, the actual operating time on this new catalyst amounted to 360 days. At that time, this high alumina catalyst accounted for over 90 per cent of the unit inventory.

In November 1952 a change in catalyst manufacturing procedure was in-

TABLE 2—OPERATING CONDITIONS OF TRIAL RUN

Feed stock	70 per cent flashed distillate
Feed rate, B./SD	35,000-37,000
Gravity, °A.P.I.	29.5
Reactor temperature, °F.	890-915
Feed preheat, °F.	740-780
Weight hourly space velocity	0.85-1.15
Catalyst/oil ratio	3.5-4.5/1
Stripping steam, lb./M. lb. catalyst	4-5
Catalyst holdup, tons (reactor)	230-260
Conversion, volume per cent	55
Regenerator temperature, °F.	1,095-1,115
Air rate, M.s.c.f./M.	55-60
Hydrogen on coke, weight per cent	8-10
CO_2/CO ratio	1.00-1.25/1
Catalyst holdup, tons (regenerator)	330-400
Total catalyst inventory, tons (average)	680
Catalyst usage, T/D	6-15
Average catalyst usage, T/D	10

Author is with American Cyanamid Co. This article is abridged from a paper presented at W.P.R.A. meeting, San Antonio, March 29, 1955.

stituted in order to raise pore volume. This material accounted for 85 per cent of the inventory by the end of the run in June 1953.

Listed in Table 2 are several of the operating conditions that existed during the test. With few exceptions due to short periods of upset conditions, these may be taken to be fairly average figures.

Catalyst Activity and Stability

Before the high alumina addition was begun, the equilibrium catalyst exhibited a U.O.P. weight activity of 26 and contained 13 per cent alumina. Fig. 1 is a plot showing the rise in Al_2O_3 content and the increase in catalyst activity. It is evident that neither the activity nor the Al_2O_3 content had reached a steady state by the end of the run.

Also, it must be remembered that there were a few unit shutdowns during the period of the run, one of which was of considerable duration. Had this not happened, quite possibly the variations in activity rating would have been less.

There is also some evidence that during the early part of the run there were some mechanical troubles that allowed steam leaks, which deactivated the catalyst to a greater extent than ordinarily would have been done.

Checking performance . . . During this run on high-alumina, Shell-Houston personnel followed the catalyst performance closely. One of their methods of checking the validity of catalyst performance in a commercial unit was to test the equilibrium catalyst in their bench-scale fluidized moving-bed catalytic cracking unit.

In this unit, a standard gas oil is used; and both space velocity and catalyst oil ratio are closely controlled. The results obtained in the bench-scale fluidized moving-bed catalytic cracking unit are then compared to current commercial results.

The evidence of the increase in catalyst activity and its effect are illustrated in Table 3. The severity factors shown are those of the commercial unit, whereas, in the test unit, the catalyst-to-oil ratio was 5.0 and the space velocity 0.8 $W_o/hr./W_c$.

One of the prime advantages that is indicated from this table is that a unit could take advantage of the higher activity by reducing the reactor temperature, thus improving the cracking selectivity and increasing gasoline yield.

Table 3 also suggests that other operating variations could be accomplished, such as increasing throughput at the same conversion level, or increasing at the same throughput rate.

Yield—Conversion Comparisons

The bench-scale fluidized moving-bed catalytic cracking unit was used to make a comparison of the cracking selectivity of the two catalysts.

Samples of 13 per cent alumina and 25 per cent alumina equilibrium catalysts were withdrawn from the commercial unit and cracking selectivity was compared at constant conditions in the laboratory fixed-bed unit.

Also, commercial yield data at essentially constant conversion were compared for periods of operation on 13 per cent and 25 per cent alumina catalysts. The periods were chosen so as to compare yields during the time operating conditions were substantially the same.

The commercial data have been corrected to 900° F. and 4.3 to 1 catalyst-to-oil ratio. The results of the test unit and commercial comparisons are shown in Table 4.

It was concluded that there was no real change in cracking selectivity when the high alumina catalyst was substituted for regular alumina catalyst. Nor was there any change in the yield-conversion relationship.

Regeneration and Stripping

During the course of the runs on 13 per cent alumina and 25 per cent alumina catalysts, regeneration temperature variations from 1,095° F. to 1,115° F. did not seem to affect the catalyst stability. Stripping of either catalyst was equally effective as the hydrogen on coke varied from 8.2-8.9 per cent by weight.

Although there is a slight indication that a lower CO_2-to-CO ratio may have resulted from the use of 25 per cent alumina catalyst, the data do not offer enough evidence completely to substantiate this claim.

Catalyst losses . . . One phenomenon exhibited during the commercial trial was a difference in catalyst losses. The stack losses were considerably lower with high-alumina catalyst than with regular alumina catalyst. At the beginning of the changeover to high alumina, the loss rate was 3.5 tons per day. As the high-alumina percentage increased, the loss rate was decreased to 1.5 tons per day in November 1952 and then increased slowly to about 2.7 tons per day at the end of the test.

After the return to regular alumina catalyst, the loss rate again increased to 4.5 tons per day. As yet, no completely satisfactory explanation can be presented as to why lower stack losses should have occurred with high-alumina catalyst. There is some thought that, due to its lower particle density, the high-alumina catalyst may have fluidized better with consequent lower entrainment rates and lower losses.

It is worthy of note that the above loss change occurred even though the fresh high-alumina catalyst contained 10 per cent more material smaller than 40 μ than did the regular catalyst, and the equilibrium particle size resulting from both catalysts was approximately the same.

Present Commercial Program

Twelve fluid catalytic cracking units are now operating on American Cyanamid's high-alumina catalyst. The combined daily fresh feed rates to these units amount to 188,000 bbl. Definite improvement in catalyst usage-activity relationship has been seen in almost every case since the units have switched to 25 per cent alumina catalyst.

Some operators have taken advantage

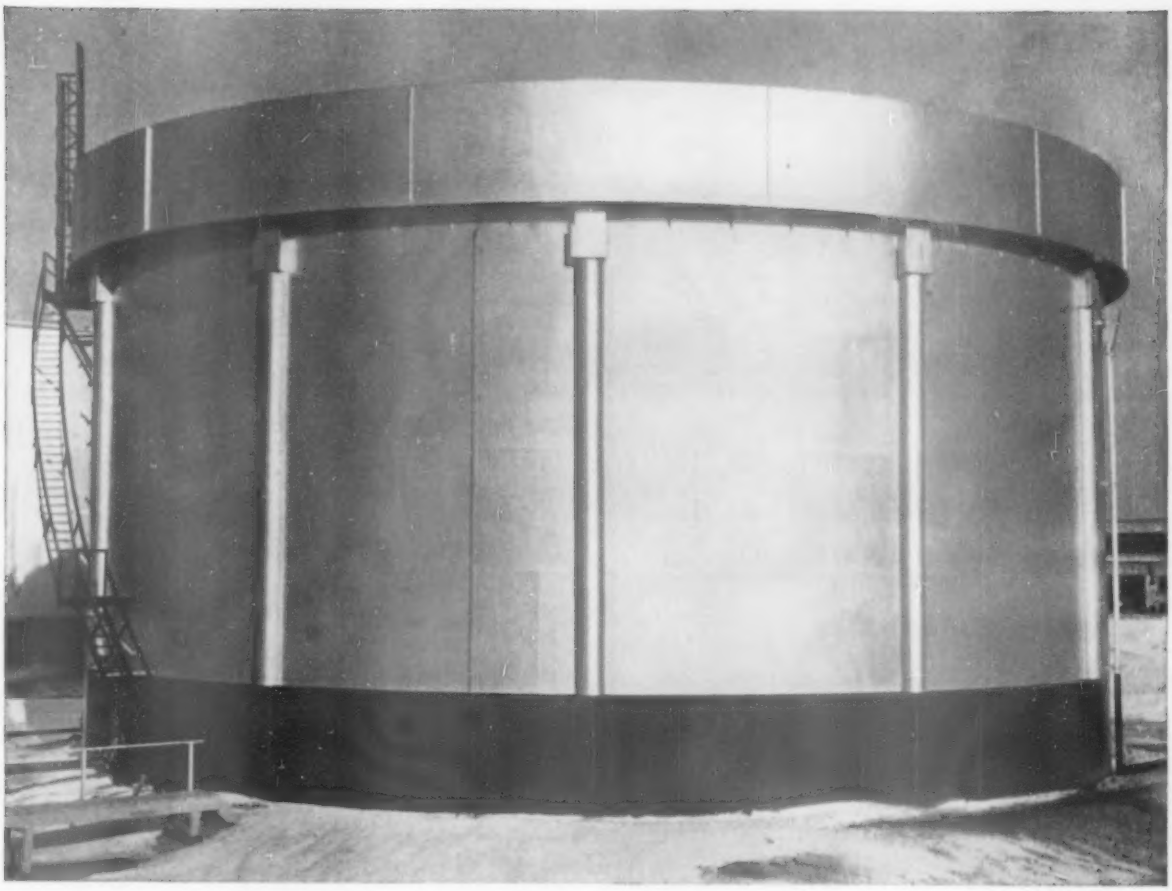
TABLE 3—COMPARISON OF CATALYST ACTIVITY INCREASE AND THE EFFECT ON UNIT OPERATION

Date—	Surface area, $m.^2/g.$	Severity factor $C/O/W_o$/ $hr./W_c$	Al_2O_3 weight per cent	Conversion, weight per cent on feed	
				Commercial 400° F. e.p.	Test unit 430° F. e.p.
January 1952	87	5.34	13.0	53.0	57.5
October 1952	96	4.46	21.2	52.0	58.4
March 1953	97	3.66	22.9	54.4	60.8
May 1953	106	3.7	23.2	55.4	63.2

TABLE 4—LABORATORY AND COMMERCIAL YIELD COMPARISONS

Catalyst equilibrium period or date of catalyst sample—	13 per cent alumina			25 per cent alumina			
	May* 1951	Jan. 1952	Nov. 1953	May* 1953	Oct. 1952	Feb. 1953	May 1953
Yields, per cent weight on feed:							
Dry gas	3.3	3.4	3.8	3.5	3.5	3.5	3.6
Total C_3	7.1	3.9	3.9	7.1	4.2	4.3	4.3
Total C_4	9.5	9.4	9.0	9.2	9.1	9.1	9.0
C_5—430° F. e.p.	27.7			27.8			
C_5—400° F. e.p.†		32.6	32.1		32.4	32.4	32.0
Carbon	2.4			2.4			
Coke		5.1	5.2		5.3	5.3	5.3
Conversion to 430° F. e.p.	50			50			
Conversion to 400° F. e.p.		54.4	54.0		54.5	54.6	54.2

*Laboratory test results: Feed, West Texas gas oil; temperature, 500° C.; process period, 60 minutes. †Commercial unit data.



Bethlehem Lifter Roof Tank Controls Air Vapor...Cuts Losses

For the "standing" storage of volatile products—that is, where you have infrequent fillings and continual withdrawals—there is no more reliable and, in the long run, no more *economical* storage than the Bethlehem Lifter Roof Tank.

It is soundly constructed; simple yet ingenious in design. The roof is actually a single-lift, roller-guided, liquid-seal gas holder. During the heat of day, as the air-vapor volume increases within the tank (or within several tanks hooked up with a single lifter roof tank to form a closed system), the roof rises smoothly, providing the extra storage space needed. At night, when the air-vapor contracts, the roof returns to the low position. Breathing losses are held to an almost negligible minimum!

In addition, the Bethlehem Lifter Roof Tank provides *all-weather* storage. The sloping cone roof, the non-freezing sealing liquid, the weather hood and the protected roller guides all assure dependable performance despite extreme cold, heavy snowfall and severe icing conditions.

There are many more features of design and construction that will surely interest you. They are fully described in our Booklet 574. We suggest you obtain a copy, by writing Publications Dept., Bethlehem Steel Company, Bethlehem, Pa.

Bethlehem Designs and Builds cone-roof tanks—dome-roof tanks—umbrella-roof tanks—lifter-roof tanks—floating-roof tanks—vapor compartment tanks—pressure vessels—gas holders—propane tanks.

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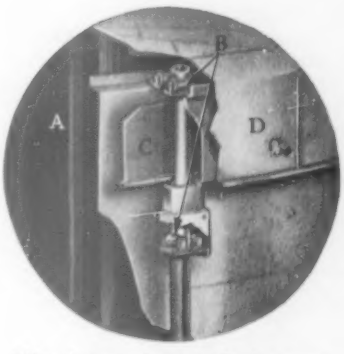


When down, roof rests on fixed supports (A). Rollers (B) guide roof as it rises. Seal is provided by dip ring (C) extending into trough filled with sealing liquid, which is shielded by weather hood (D).

BETHLEHEM STEEL

of high-alumina catalyst to increase their unit equilibrium activity at the same catalyst usage rate. Others have maintained a constant activity at reduced catalyst usage.

As most of these units have begun the use of 25 per cent alumina catalyst since November or December 1954, it is too early to determine if there have been any selectivity or yield changes. These points are being followed closely, however, and there is a slight indication that some selectivity advanfage may be experienced.

Makeup reduced . . . One operator, upon changing to 25 per cent alumina catalyst, immediately reduced catalyst usage from 2 tons per day to 1½ tons per day, and later reduced the usage slightly below this last figure. Tests on equilibrium catalyst from this unit were run and the results from this series are shown in Table 5.

Even at the 25 per cent reduction in catalyst addition rate, the U.O.P. weight activity increased 13 per cent in the time span covered by these tests. Initially, the coke factor and gas factor of the catalyst were reduced indicating a selectivity advantage. However, these factors began to increase later in the run, an increase that can be attributed to high reduction in catalyst usage.

Activity rises . . . Another fluid-unit operator initiated the use of 25 per cent alumina catalyst by adding at his normal catalyst addition rate to equilibrium catalyst that was quite badly deactivated. In 2 months, the activity had risen to the level at which the unit was to operate. Sometime later, the usage rate was reduced 50 per cent. The activity has remained steady since that time.

Data on this unit are presented in Fig. 2. It should be pointed out that the extremely large pore diameter of the equilibrium catalyst indicates that it has been subjected to severe steam deactivation conditions. The further rise in pore diameter would indicate that severe steam deactivation is continuing in this unit.

Another operator who has taken advantage of the greater activity stability of 25 per cent alumina catalyst has not changed the catalyst addition rate. As the alumina content has increased from 13 per cent to 17.9 per cent, the U.O.P. weight activity has risen from 30 to 35; a 16.5 per cent increase. Other units have shown activity increases of less degree.

Less stack losses . . . One of the operators of a large unit that is equipped with a Cottrell precipitator has reported that since starting the use of high alumina, the stack losses have been decreased appreciably. Quantitative results are not available, however. The method of this assessment is that the recorded precipitator loadings have been less, and the quantity of catalyst for withdrawal to maintain a constant inventory has been more.

This unit has had an activity increase from 30 to 34 U.O.P. weight, which at this time is higher than desirable. The unit operation on high-alumina catalyst is described as completely satisfactory.

Current Production of 25 Per Cent Alumina Catalyst

Physical and chemical tests on current production of high-alumina catalyst show it to be superior to that which had been produced for the first commercial trial. Impurities have been reduced. Control of pore volume, pore diameter, and apparent bulk density is better. Both initial activity and activity stability are higher.

Particle-size distribution is improved in that it contains less +80 μ material and less —30 μ material. Due to its lower apparent bulk density, 25 per cent alumina catalyst can contain more +80 μ material and have the same flow and fluidization characteristics as does a higher apparent bulk density catalyst containing less +80 μ material.

Current 25 per cent alumina catalyst is represented by the values shown in Table 6. These figures can be used as typical values of material now being produced at a rate of over 1,000 tons per month.

TABLE 6 — AEROCAT TRIPLE A HIGH ALUMINA CATALYST — TYPICAL CHEMICAL AND PHYSICAL PROPERTIES

Chemical analysis, per cent by weight, dry basis:	
Al_2O_3	25.0
Silica (by difference)	74.46
Iron as Fe	0.03
Sodium as Na_2O	0.01
Sulfate (SO_4)	0.50
Per cent loss on ignition	15.0
A.B.D., g./cc.	0.40
Activity (weight rating)	125
Specific surface, $m.^2/g.$	550
Pore volume, cc./g.	0.97

TABLE 5—ACTIVITY—SELECTIVITY CHANGES COMPARED TO INCREASE IN HIGH-ALUMINA CONTENT OF EQUILIBRIUM CATALYST

Date—	11-9-54	12-4-54	12-20-54	1-18-55
Al_2O_3, weight per cent	14.5	16.8	16.5	18.8
A.B.D., g./cc.	0.79	0.75	0.78	0.76
Activity, volume per cent	36	36	40	39
Activity, weight per cent	23	24	26	26
Surface area, $m.^2/g.$	68	70	74	71
Pore volume, cc./g.	0.18	0.19	0.21	0.22
Pore diameter, A	106	108	112	124
Coke factor	1.28	1.13	1.22	1.25
Gas factor	0.98	0.86	0.91	1.05
Catalyst usage, lb./bbl. fresh feed	0.47	0.35	0.29	0.29

Cutaway Model Shows Flow Scheme of Distillation Unit

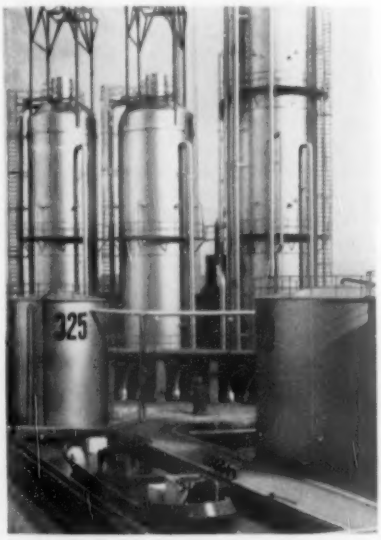
A WORKING model of a distillation unit made at the Amsterdam laboratory of Royal Dutch-Shell Co., Ltd., is used to instruct commercial, administrative, and technical trainees.

The cutaway miniature is based on one of the newest units of the Pernis refinery, near Rotterdam, Netherlands. Built on a scale of 1 to 50, the model shows both the outward appearance and operation of a modern distillation plant.

A simplified flow scheme is demonstrated by the model. Crude oil (brown) is split up by atmospheric distillation into gasoline (colorless), kerosine (tinted), gas oil (reddish brown), and residue (black).

To make the liquids "boil" properly and to prevent the various fractions from mixing, the model has eight electric liquid pumps and two air pumps.

A hidden electric system turns on and off the driving parts and lighting at regular intervals.



Cutaway model shows columns, pump houses, and furnaces of distillation unit used as training aid by Royal Dutch-Shell Co., Ltd. The working model can be dismantled and shipped.

CRANE VALVES have longest life in this sulphur pit

THE CASE HISTORY— Leakage in steam lines to sulphur pit heating coils was hindering operations at International Minerals & Chemical Corp. plant at Lockland, Ohio. The condition prevented servicing of traps, strainers and the heating coils.

Valves that leaked beyond repair after as little as 6 months' service were the source of the trouble. Their seating as well as packing failed to stand up.

In January, 1953, after trying other types, Crane 14½P Plug Type Disc Globe Valves were installed. Today, they're still giving excellent service at low cost. Recently, the steam piping was completely replaced—the Crane valves were repacked and put back in the lines. That's all the maintenance they needed after 18 months in this severe service.

Crane 150-Pound No. 14½P Plug Type Disc Brass Valves

Long-wearing, hard seating surfaces in a rugged, well-proportioned, Crane-designed body make these valves exceptionally suited for steam and other severe services. Consult your Crane Catalog or your Crane Representative.

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CRANE'S FIRST CENTURY . . . 1855-1955

So You're a Young Engineer . . .

. . . and you want to get ahead?

by Arthur J. Altz

All right—here's what you must bone up on

- Attitude
- Reputation
- Ideas
- Cooperation

THE young engineer, leaving college and entering industry, is usually showered with advice from all sides. That is probably because advice is the cheapest commodity there is and, therefore, the least desired. More than advice, the young engineer needs experience—and experience is often very costly. Most technical experience must be gained the hard way—by making mistakes and correcting them. On the other hand, experience in dealing with people can be gleaned from old timers who have lived through many personal experiences.

The Right Attitude

Every young engineer makes a difficult transition when he first enters industry after completing his college education. He is likely to make mistakes, and no one will hold his mistakes against him if he makes an honest effort to correct them. Much depends on his attitude if he is to make a successful transition into industry. If the young engineer assumes a superior attitude he can expect little help. If he is humble and admits his lack of experience nearly everyone will extend a helping hand.

The attitude of the young engineer toward his work is of the greatest importance. When he honestly enjoys his work he approaches each new day on the job as a challenge to his ability, ingenuity, and ambition. With this happy mental attitude, he is eager to see what the day will bring and how he can solve its problems and, when each day is done, he can feel as if he has been in a spirited but friendly competitive game and has won.

Every job includes some distasteful duties, so the young engineer should not become discouraged too easily. He must learn to enjoy doing what his engineering job requires him to do if he is to get real enjoyment from his work. If he just cannot enjoy his work, perhaps he is working for the wrong company or in the wrong department. If this is the case, he will do himself and his employer a favor by finding a job where he can be happy.

Author is with General Motors Corp. Material also published in General Motors Engineering.

Building a Reputation

When the young engineer enters industry, he begins to establish a reputation. The building of that reputation begins with the first calculation or the first instrument reading he makes, with the first line he draws, or with the first letter he dictates and the building process continues with every personal contact he makes. Like any structure, a reputation is not built completely in a day or a week. It rises slowly, stone by stone, upon the footings.

I like to think of education as the footings of every man's career. If the footings have not been laid deep and wide and strong they must be strengthened by supplementary college courses at night or by judicious private study, if the structure of his reputation is to be well supported.

When the young engineer starts to build a reputation, his early mistakes can be corrected quite easily. The trick is to find the mistakes early enough so that an effective correction can be made. When a mistake recurs too often it may become a habit which can seriously damage a promising reputation. Then, it is usually necessary to overcorrect. As an example, if a young engineer starts out with utter disregard for accuracy, an early correction can be made without hurting his reputation too much. But, if the correction is postponed too long he has established a reputation for being inaccurate. Then, the correction must be overdone. Instead of the usual 1 per cent leeway, accuracy must be held within one tenth of 1 per cent—just to prove that the reputed failing has been overcome.

There are many things which will help to establish a good reputation for the young engineer. These include always doing his best on the job, looking beyond his exact assignment, never giving a snap answer unless he is reasonably sure that it is the right answer, backing up his criticisms with specific remedies, being reliable, and being decisive.

A good reputation can often be seriously damaged by tardiness. It goes much deeper than the hours and minutes recorded by the time clock. The man who is habitually late for work usually procrastinates about getting his job assignments started and finished, and plain ordinary procrastination has wrecked more promising careers than lack of technical ability. Getting to work on time requires a certain amount of organization and preparation. How can a man who fails in such a simple organizational task be entrusted with the organization of an engineering project? In my experience, tardiness is just evidence of inaccuracy. I have never known a man who was noted for doing accurate, meticulous work who did not enjoy a reputation for punctuality.

All these qualities, and many more, combine to build the engineer's reputation. He builds it stone by stone on the foundation of his education. He alone determines the nature of his reputation structure. He can make it a glittering skyscraper reaching to the stars or a tumble-down shack.

Ideas

Ideas are of the greatest importance in engineering. They are the very life of our profession. Around the drawing board and in the laboratory, ideas are usually hatched at least one a minute. Some are good but the majority are usually bad. This is the very nature of engineering.

Every young engineer, after he progresses beyond the detail drafting stage, is expected to have ideas. That quality is his stock in trade. Ideas are what he is paid to produce. They are the objective of his education.

Every phase of each engineering project invites new ideas. However, it is well to remember that very few ideas are entirely original. The idea that pops into the young engineer's mind may be new to him, but it probably has been thought of by dozens of people before. He is merely applying an old idea to the solution of an immediate problem. In most cases, discussion of the problem only sets the stage for his idea.

Because engineering design is necessarily a cooperative effort, it is usually difficult to determine who originates any specific idea. One person will contribute an idea and another person may raise an objection. Another person will come up with a modification to overcome the objection. The person who voiced the first suggestion proposes another modification, which again makes

FORMATION WATER CONTROLLED

SOS (Slurry Oil Squeeze)—new DOWELL service for oil and gas wells—stopped water production completely, aided effectiveness of fracturing

Dowell's new Cementing Service—SOS (Slurry Oil Squeeze)*—is designed to provide a fast, low-cost means of ending troublesome water encroachment in oil and gas wells.

Production records have proved the effectiveness of SOS. For instance, one oil well completed in a sandstone formation was producing 200 barrels of salt water and only 3 barrels of oil per day. SOS by Dowell stopped the water completely and paved the way for a small gallonage Sandfrac† treatment. After the fracturing treatment, the well pumped 75 BOPD with no water.

Dowell engineers premix the entire batch of slurry for SOS in truck-mounted, paddle-mixing tanks. This equipment is specially designed to mix a uniform slurry—even in small batches. High-pressure triplex pumps are used to inject the slurry into the formation. The SOS slurry is made up of portland cement, a Dowell surface tension reducing agent and a non-aqueous carrying medium—for example, specially blended oils. The cement sets up only when contacted by formation water.

Contact the nearest Dowell office for more information on SOS or any of Dowell's many oil field services—in Venezuela, contact United Oilwell Service, S.A. Or write Dowell Incorporated, Tulsa 1, Oklahoma, Dept. D-11.

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†Sandfrac is a registered service mark of Dowell Incorporated

services for the oil industry

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the rounds. That is why it is often difficult to determine who really originated a design idea and who should get credit for it.

That question of who shall get credit for an idea is something the young engineer should be careful to keep in mind. When he is engaged in a design or development project, he is expected to contribute ideas along with everyone else. If he hugs his little piece of an idea possessively to his chest and loudly proclaims, "That's my idea," he brands himself as an "idea hound." Nothing will serve as a more effective repellent to help from his associates, which the young engineers need so badly. No engineer has a corner on all the good ideas, and the smart engineer does not hold on to every one of his ideas as if it were the last one he ever expects to have.

Cooperation

Engineers must work together to accomplish the desired results. In a well-organized engineering department nothing worth while is accomplished without cooperation. Engineers working together, with the help of draftsmen, designers, mechanics, and technicians, can accomplish wonders in carrying out their specific assignments.

Every young engineer must decide for himself whether or not he is going to be cooperative. He must decide whether he will carry his share of the work load willingly, help his fellow workers, accept assignments beyond his regular duties, and operate in line with the spirit of departmental regulations. That decision may well have an important bearing on his future success.

As he gains experience, the young engineer will find out that in a well-integrated engineering organization engineers can accomplish little as individuals. Cooperative effort is what counts most and the young engineer who learns early to cooperate will profit the most in the long run.

Promotions

The man who does exactly what his job requires and nothing more will probably hold his job if he does it well. The chances for his promotion to a bigger job are pretty slim, however, because no one knows that he might be capable of doing something more.

The man who takes on assignments that are not part of his regular duties, unless they are outright impositions, will soon outgrow his job and force his boss to recognize his ability to handle a bigger job. If it seems that recognition is lagging, the young engineer should look for ways to do more work or better work. The extra effort will never fail to pay off.

A promotion has different effects on different people. Some men who are promoted get the idea that they have arrived and that there is no further reason to put forth effort. The wiser promotees consider their promotion as an opportunity to put forth even greater effort, not only to justify their selection, but to qualify for the next step up.

Obviously, the man who is just a little apprehensive about his ability to handle his new and bigger job is likely to do a good job. Therefore, he is likely to be a good prospect for the next step up the ladder of success. Many men have failed because of a "swelled head." Relatively few failures have been due solely to lack of technical ability. As long as a man remains humble, there is little danger of failure. It is when the young engineer outgrows his hat that he has cause to worry. Strangely, when he begins to think that he is pretty good, other people begin to think otherwise.

When the young engineer is promoted, it is wise for him to take an honest inventory of himself. He should ask himself, in complete honesty and humility, "Why was I selected for the new job, and what do I have to contribute to the job?" Without egotism, he should also answer the question, "Where can I go from here?" His answer to these questions, and the action which his answers may stimulate, will prove conclusively whether he really has what it takes to get ahead or whether his superiors have overrated him.

The young engineer's first promotion is probably the greatest challenge he will ever face. It can swell his head or shrivel his soul. If it does either of these he does not deserve the promotion. If he gets a swelled head he is convinced that he has arrived and he will probably not strive to do his best on his new job, much less will he prepare for the next job ahead. If his promotion shrivels the young engineer's soul he will find himself in trouble.

Decisions

An insidious foe of personal progress is indecision. Many engineers who do outstanding work on the technical side of their jobs fail miserably when it comes to making decisions. To them, making a decision is really a difficult task. They would rather propose several alternate designs than to be decisive in selecting the one best design. This habit of proposing alternates rather than making decisions can really retard a man's progress, and engineers who have this bad habit need to discipline themselves to be decisive.

The man who would influence the opinions of others must learn to make up his own mind. Making decisions is not a hard job. It requires only that all of the pertinent facts be weighed in the light of one's best judgment—based on his own knowledge and experience—and then to decide on the best course as he sees it.

The young engineer should not be unduly concerned about having his decisions reversed—everyone does. In my experience, his boss will have a higher opinion of him if the engineer makes a decision that he can reverse rather than making no decision at all. The young engineer can learn something from each decision that is reversed. Usually, the reversal is made by someone in higher authority who has had more experience. The wise engineer takes advantage of that experience to help him make better decisions in the future. Above all, he should not pout and brood over every reversed decision.

Summary

These guides will be helpful to the young engineer on his way up the ladder of success:

- **Treat them nicely on your way up—you may meet them on your way down.** The young engineer whose drafting technique and lettering I criticized unmercifully became my chief engineer. He had more on the ball so he passed me on his way to the top. Fortunately for me, he realized that my criticism was in the best interest of the operation. Had my criticism been out of line, and had the chief engineer been a less understanding individual, the results might have been quite different for me.

- **Be true to your profession.** Because of his education, and by his own choice, a young man finds himself in the engineering field. It is a profession to be proud of. It requires certain standards of living and action. By conforming to those standards the young man entering industry proves himself to be worthy of his chosen profession.

- **Above all, be a man.** The young engineer starting out in industry may never attain the top position in his field, but he can always live up to the code of manhood. When he comes to the end of his career, all he will have left are his conscience, his material possessions, and the regard of his colleagues. The importance of material things will lessen with the passing of the years, but the voice of conscience will become louder and the regard of his colleagues will become more important.

The young engineer entering industry is on the threshold of a useful and interesting career. How he ends that career is of his choosing. He, and he alone, will decide whether or not he will be rated as a man by his colleagues on that far-distant day when he comes to the end of his engineering career.

How to choose the right

Centrifugal Compressors for Gas Pipelines

Here's a step-by-step procedure that will insure the proper selection

by T. C. Heard

THE extensive use of centrifugal compressors for gas pipeline pumping in the past 6 or 7 years has resulted in great improvement in compressor design and manufacture. Knowledge and experience in applying centrifugals is becoming more common. Selecting the right centrifugal compressor to do the job is not a thing of chance, but can be done accurately. Shown here are the steps taken in selecting a centrifugal compressor, to be driven by a combustion gas turbine, for gas pipeline pumping.

Steps for Compressor Selection

To illustrate the selection of a centrifugal compressor, assume a 30-in.-diameter pipeline is to normally carry 600 M.M.s.c.f.d. flow. Let 900 psia. be the maximum line working pressure.

Economics, future expansion, terrain, etc., are all weighed in selecting station spacing along the pipeline. This article is not concerned with these factors, however, and a spacing of 95 miles is arbitrarily set.

Author is with industrial engineering section, General Electric Co.

The steps taken in picking the compressor are outlined as follows:

1. The station suction pressure and compression ratio for normal 600 M.M.s.c.f.d. flow is determined.

2. Using the station suction pressure, compression ratio, and flow, the approximate station horsepower is determined.

3. The prime mover is assumed to be a 6,700-hp. combustion gas turbine. A number of these units are picked to provide the total station horsepower.

4. The normal station compression ratio is then divided equally among the station units. Then the normal compression ratio for each compressor is determined.

5. The normal flow, suction pressure, compression ratio, speed, and gas characteristics are furnished the compressor manufacturer. Also various expected conditions of flow and pressure are assumed, so that compressor characteristics best suitable for the expected conditions can be chosen.

Now let us go back and take up each of these steps in more detail.

Station suction pressure . . . Most engineers working with pipeline-flow formulas eventually devise some graphical solution. Fig. 1 shows such a graphical solution of the Panhandle Eastern formula used in determining pressure flow relationships.

Starting with 600 M.M.s.c.f.d. flow on the left side of Fig. 1 go up to the 30-in. line. Proceed right to the 95-mile line and vertically to the 900 psia. initial pressure line. Then go right to read 555 psia. station suction pressure.

Of course, this graphical solution holds true for only one set of conditions, i.e., gas temperature, specific gravity, pipe efficiency, compressibility, etc. It is a simple matter to correct for any variations from that of Fig. 1, however.

For example, the pipe efficiency factor is a means of adjusting the formula to indicate true conditions for a particular line. It takes into account such things as water and dirt in the line. From experience the engineer might wish to use an efficiency of 0.90 instead of 0.92 as the chart uses. If the actual flow is 600 M.M.s.c.f.d., he uses $600 \times 0.92/0.90 = 613$ M.M.s.c.f.d. flow with the chart. By using 613 M.M.s.c.f.d. he finds the same pressure drop he would find if he used 600 M.M.s.c.f.d. on a chart specifically prepared for 0.90 efficiency.

The right hand side of Fig. 1 is used to determine station compression ratio and horsepower. Starting at 555 psia. suction pressure proceed right to the 900-psia. discharge line and down vertically to read 1.650 station ratio. For rough approximations this value of compression ratio takes into account 5-psia. suction piping drop and 5-psia. station discharge piping drop.

To determine station horsepower, start at the 1.650 ratio point and go vertically to the 600 M.M.s.c.f.d. flow line. Then go to the right to read 16,200 hp. Note that this horsepower is based on one particular set of gas and compressor conditions as indicated on the chart. Therefore, for all but these particular conditions, it is not accurate, but is still suitable for approximation, however.

Gas turbine characteristics . . . Fig. 2 shows the maximum capability of the

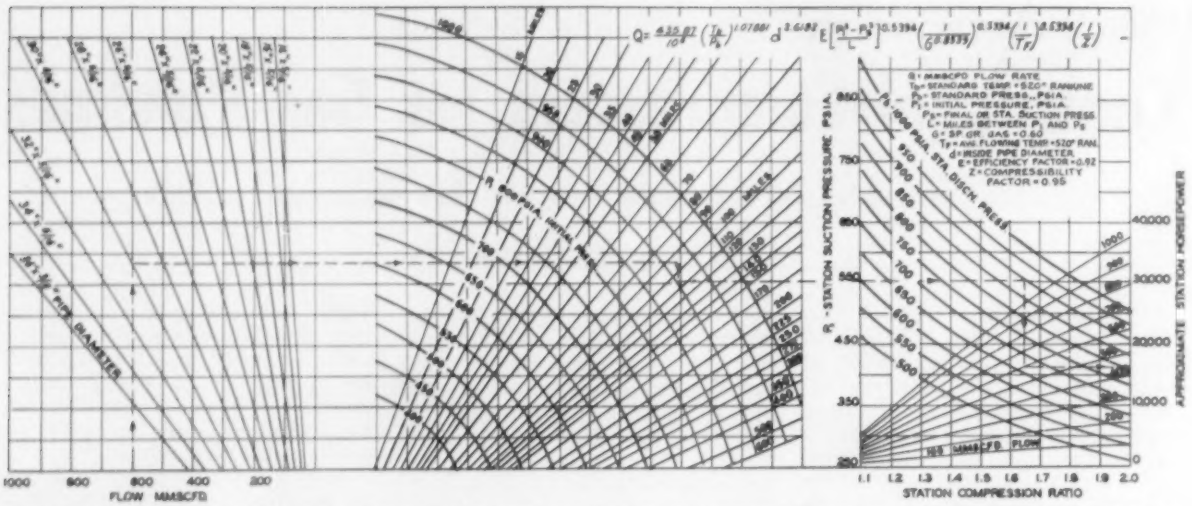
Who's Using Adjustable-Speed Centrifugal Compressors?

There is now approximately 340,000 hp. of adjustable-speed centrifugal compressors pumping natural gas in pipelines. The distribution of these units is as follows:

El Paso Natural Gas Co.	28—5,700-hp. units
Southern Counties Gas Co.	2—5,700-hp. units
Atlantic Seaboard	1—5,700-hp. unit
Northern Natural Gas Co.	8—5,700-hp. units
United Gas Pipe Line Co.	1—5,700-hp. unit
Tennessee Gas Transmission Co.	1—5,000-hp. unit
Mississippi River Fuel Gas Co.	1—2,000-hp. unit
Transcontinental Gas Pipe Line Co.	9—5,000-hp. units
Creole Petroleum Corp.	10—6,000-hp. units

All of these units, except those of Transcontinental, are driven by combustion gas turbines. The Transcontinental units are steam-turbine driven. In addition to the above units, Texas Eastern Gas Pipe Line Corp. has approximately 200,000 hp. of constant-speed electric-motor-driven centrifugal compressors.

These units represent a range of flows from 200 to 1,200 M.M.s.c.f.d. Most of the pipeline stations range in size from 5,700 hp. (one turbine compressor per station) to 22,800 hp. (four turbine compressors per station). When selecting the centrifugal compressors for a gas pipeline, it becomes apparent how flexible these machines are when driven by an adjustable-speed prime mover.



GRAPHICAL SOLUTION of Panhandle Eastern gas-flow equation. Total station horsepower is based on a compressor efficiency of 83 per cent, gas temperature of 520° R., gas specific gravity of 0.60, and gas C_p/C_v of 1.27. Fig. 1.

6,700-hp. regenerative cycle two-shaft gas turbine for different altitudes and ambient temperature. For our purpose here, assume all the stations on the hypothetical pipeline are below 1,000 ft. elevation.

Fig. 3 shows the maximum horsepower-speed available at various ambient air temperatures. Of course, the machine can and does run at lower values of horsepower as required. These curves show that high horsepower can be furnished over a fairly wide speed range, allowing flexible operation of the centrifugal compressor.

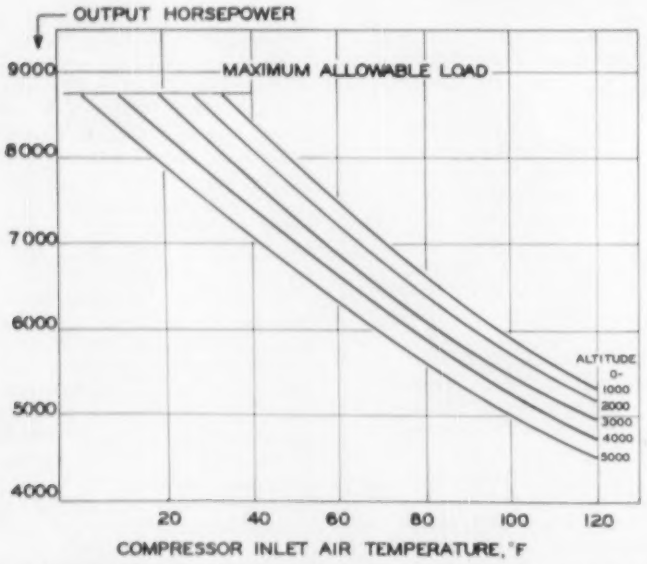
Turbine load limits are shown for 110°, 80°, and 40° F. ambient temperature. As air temperature decreases, the turbine can provide more horsepower. This ability to supply more horsepower in the wintertime fits closely the usual pattern of more gas demand by consumers in cold weather.

With the station normally using about 16,200 hp., three 6,700-hp. gas turbines would be chosen, each normally operating at 5,400 hp. At 5,400 hp. what speed should the turbine-compressor run?

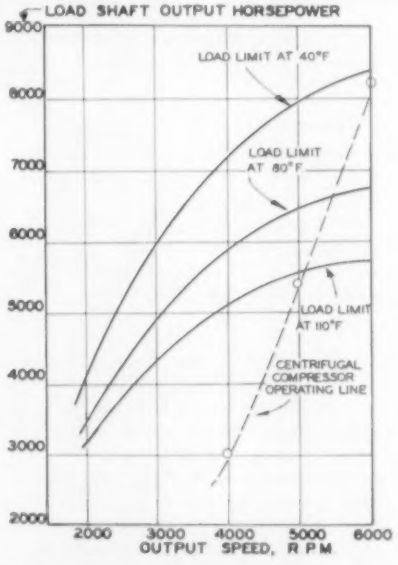
Operating speed . . . When more gas is demanded in cold weather, the pipeline flow increases and the station suction pressure goes down. To pump this higher flow the station must operate at a higher compression ratio and horsepower. The compressors must speed up to produce this higher compression ratio and horsepower. Therefore, the normal operating speed of the compressor should be picked low enough to allow margin for speeding up to handle the high wintertime horsepower and compression ratio demands.

When the compressor speeds up to handle the higher flow and compression ratio, its horsepower increases as some function of the speed. For the hypothetical pipeline of this article, it is found that the horsepower varies about as the square of the speed. Of course, this is only true when all three units speed up and divide load evenly.

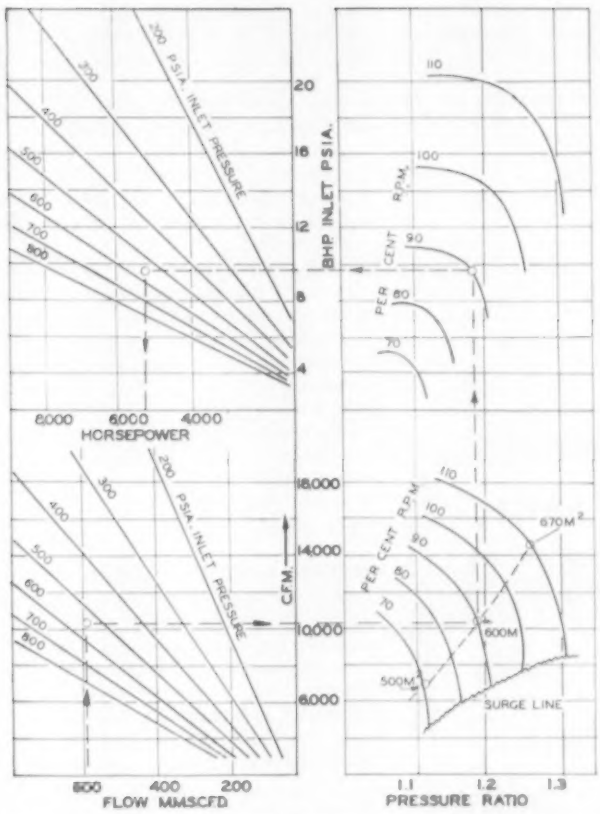
Therefore, with normal 5,400 hp., a normal operating speed of approximately 4,950 r.p.m. is selected. The compressor can then speed up to 6,000 r.p.m. maximum speed and absorb 8,370 maximum horsepower. These operating points are superimposed on



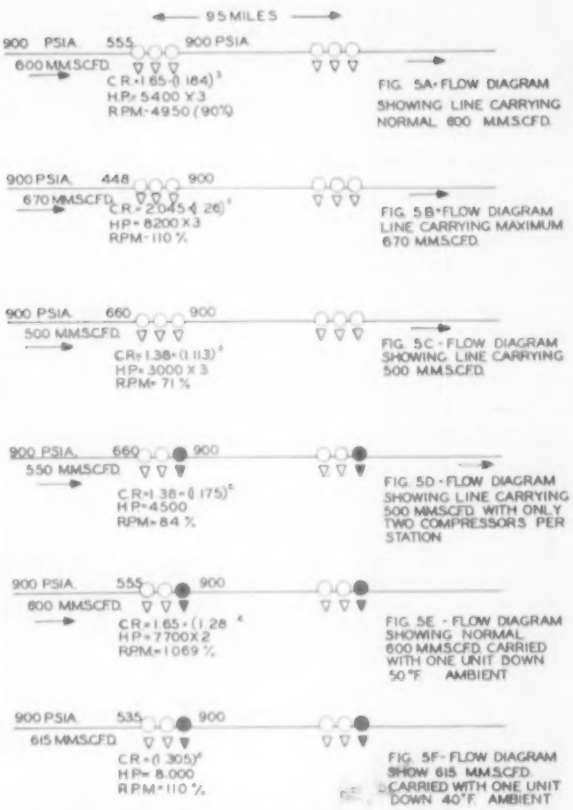
SHAFT HORSEPOWER output vs. compressor inlet air temperature for 6,700 hp. regenerative-cycle, two-shaft gas turbine. Fig. 2.


LOAD SHAFT OUTPUT HORSEPOWER
LOAD LIMIT AT 40°F
LOAD LIMIT AT 80°F
LOAD LIMIT AT 110°F
CENTRIFUGAL COMPRESSOR OPERATING LINE
OUTPUT SPEED, R P M

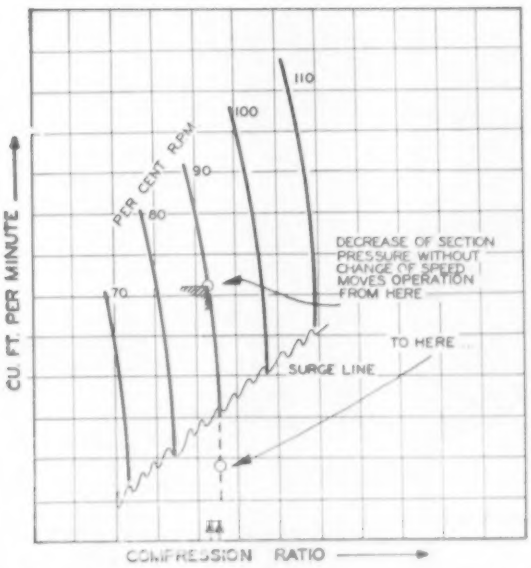
SPEED VS. HORSEPOWER curves for 6,700 hp. two-shaft gas turbines. Fig. 3.



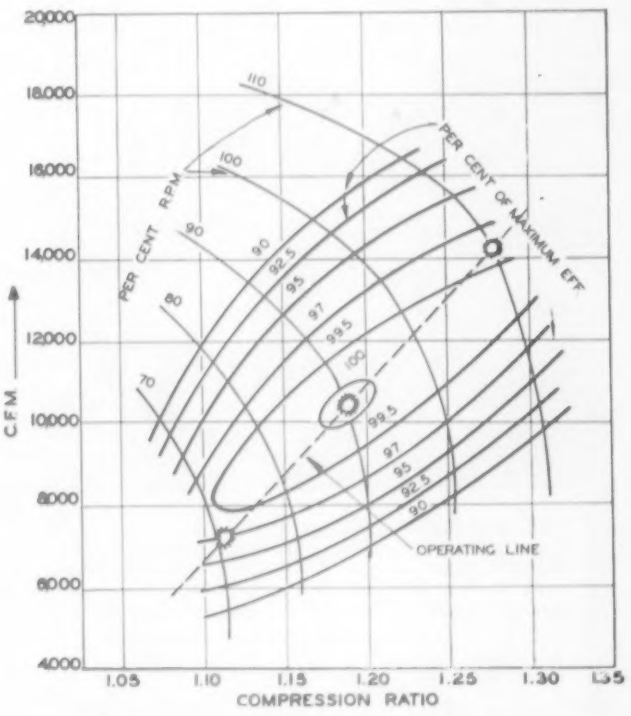
TYPICAL CHARACTERISTIC CURVES for centrifugal compressor. Fig. 4.


95 MILES
900 PSIA 555 900 PSIA
600 MMSCFD
C R=1 65-(0 184)³
HP=5400 X 3
RPM=4950 (90%)
FIG. 5A-FLOW DIAGRAM SHOWING LINE CARRYING NORMAL 600 MMSCFD.
900 PSIA 448 900
670 MMSCFD
C R=2 045-(1 26)⁵
HP=8200 X 3
RPM=110 %
FIG. 5B-FLOW DIAGRAM LINE CARRYING MAXIMUM 670 MMSCFD.
900 PSIA 660 900
500 MMSCFD
C R=1 38-(1 113)⁵
HP=3000 X 3
RPM=71 %
FIG. 5C-FLOW DIAGRAM SHOWING LINE CARRYING 500 MMSCFD.
900 PSIA 660 900
550 MMSCFD
C R=1 38-(1 175)⁵
HP=4500
RPM=84 %
FIG. 5D-FLOW DIAGRAM SHOWING LINE CARRYING 500 MMSCFD WITH ONLY TWO COMPRESSORS PER STATION
900 PSIA 555 900
600 MMSCFD
C R=1 65-(1 28)⁴
HP=7700X2
RPM=1069 %
FIG. 5E-FLOW DIAGRAM SHOWING NORMAL 600 MMSCFD CARRIED WITH ONE UNIT DOWN 50°F AMBIENT
900 PSIA 535 900
615 MMSCFD
C R=(1 305)⁴
HP=8,000
RPM=110 %
FIG. 5F-FLOW DIAGRAM SHOW 615 MMSCFD CARRIED WITH ONE UNIT DOWN 40°F AMBIENT

COMPRESSION RATIOS and compressor **arrangements for various flow conditions used in this example problem. Fig. 5.**



SURGING may result if **compressor** has flat characteristic curves. Fig. 6.



EFFICIENCY and revolutions-per-minute contours for typical centrifugal compressor. Fig. 7.

the turbine curves of Fig. 3. If normal operating speed had been picked at some higher r.p.m., the compressor would not absorb the maximum capability of the turbine when operating at maximum 6,000 r.p.m.

Selecting the Centrifugal Compressor

The flow diagram of Fig. 5A shows that each of the three compressors in the station would operate at approximately 1.184 compression ratio. The first compressor normally operates at 550 psia. inlet pressure (allowing 5 psia. inlet piping drop), which at 600 M.M.s.c.f.d. means approximately 10,000 cu. ft. per minute. For the first compressor then, the manufacturer would be asked for characteristics for the following conditions:

1. Design point, compression ratio	1.184
2. Design point, cubic feet, per minute	10,600
3. Design point speed, r.p.m.	4,950
4. Maximum horsepower	8,370
5. Maximum speed, r.p.m.	6,000
6. Gas specific gravity	0.60
7. Gas C_p/C_v	1.27
8. Gas inlet temperature	60 F.

The compressor manufacturer might offer a compressor with characteristics as shown in Fig. 4. Now to see if this particular machine will do the best job.

The lower left quadrant of Fig. 4 is used to convert inlet pressure and M.M.s.c.f.d. flow to actual cubic feet per minute. As shown, 600 M.M.s.c.f.d. at 550 psia. indicates 10,600 cubic feet per minute.

The lower right quadrant indicates what speed is necessary to obtain a certain compression ratio as a given throughput. The normal 10,600 cubic feet per minute and 1.184 compression ratio indicates a speed of 90 per cent (4,950 r.p.m.).

Going vertically to the upper-right quadrant, the particular compression ratio and speed are used to indicate horsepower per inlet psia. At 1.184 compression ratio and 90 per cent speed, the curve indicates 9.6 b.hp. per inlet psia.

The upper-left quadrant uses b.hp. per inlet psia. and inlet psia. to give the required horsepower. At 9.6 b.hp. per inlet psia. and 555 psia. the machine needs 5,400 hp.

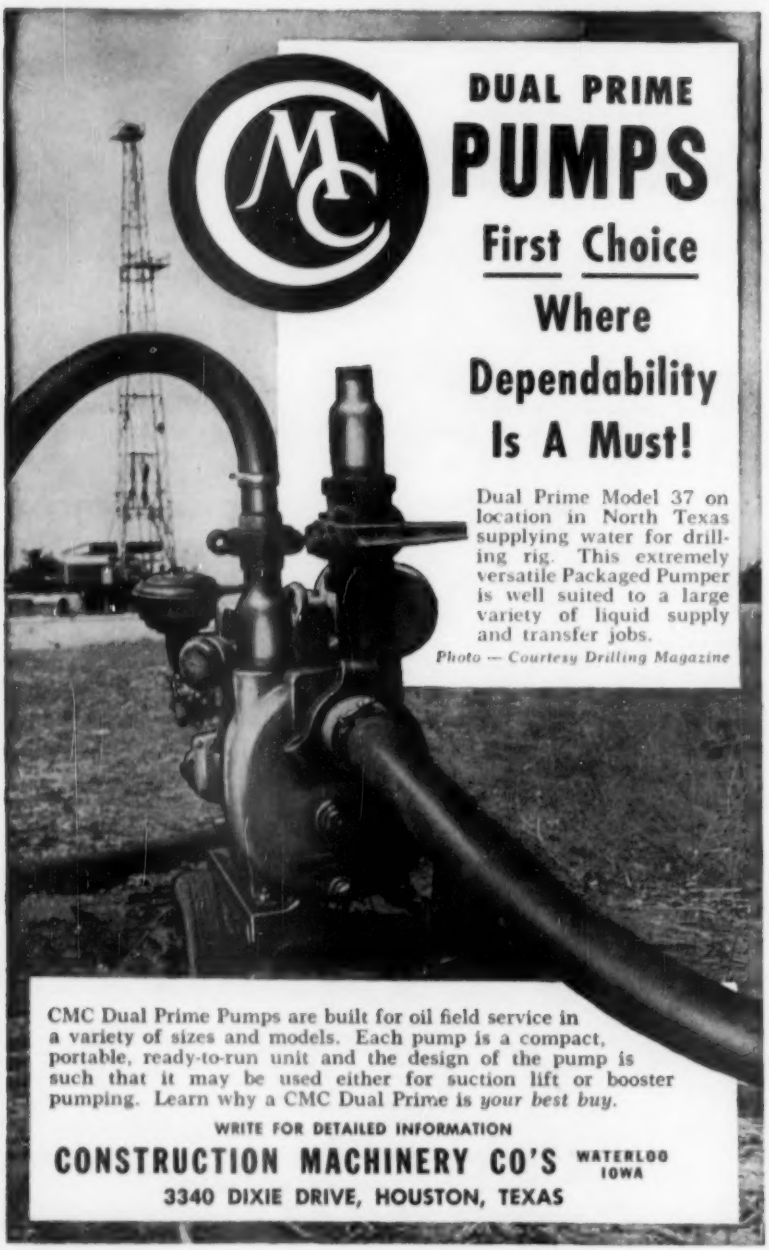
High and low flow . . . The maximum possible flow of the pipeline is limited by station horsepower or station compression ratio. By assuming different flows the station suction pressure, compression ratio, and horsepower can be calculated as before. Thus by trial and error the maximum flow of the pipeline is determined to be approximately 670 M.M.s.c.f.d. Fig. 5B shows this condition.

At the maximum flow of 670 M.M.s.c.f.d., the first compressor operates at 1.26 compression ratio and 14,400 cu. ft. per minute. This point is shown on the compressor characteristic, Fig. 4.

If the pipeline were to deliver only 500 M.M.s.c.f.d., it might operate as shown in flow diagram Fig. 5C. The first compression ratio is now 1.113 at 7,200 cu. ft. per minute as shown plotted on Fig. 4 characteristic. The 500 M.M.s.c.f.d. flow can be handled also with only two turbines per station as shown by flow diagram Fig. 5D. This way the first turbine will operate at 7,200 cu. ft. per minute but at 1.175 compression ratio, which the compressor characteristic indicates can be handled easily.

Thus, it appears that the characteristics of Fig. 4 are about the right ones for the hypothetical pipeline. This compressor will make use of the turbine maximum horsepower. Also low flows are well within range of the compressor.

Emergency operation . . . It may happen that one compressor is shut down while the line is carrying 600 M.M.s.c.f.d. The station can maintain 900 psia discharge if each of the two remaining compressors develop 1.284 compression ratio. Refer to Fig. 5E. The first compressor still has to handle the normal 10,700 cu. ft. per minute, but now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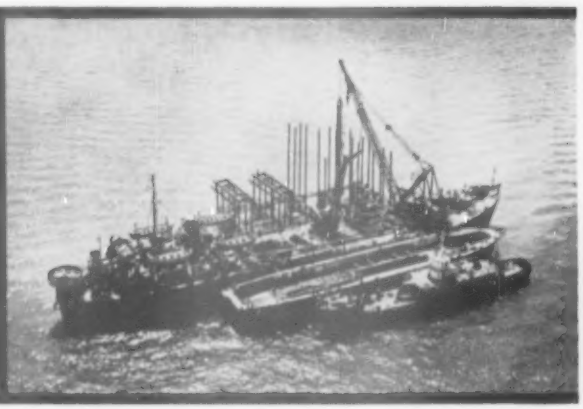

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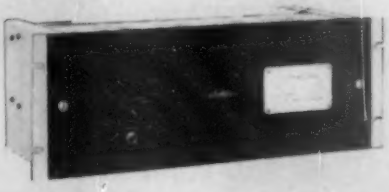

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speeds up to approximately 107 per cent speed (5,880 r.p.m.) as shown by the curve. About 7,700 hp. is needed. The turbine can produce this if the ambient temperature is around 60° F.

If the weather is colder, such that 8,000 hp. is available from each machine, the line can carry 615 M.M.s.c.f.d. with only two machines operating in each station as shown in flow diagram, Fig. 5F.

Surge problem . . . On the compressor characteristic of Fig. 4, a surge line is marked. If the amount of gas entering the compressor is below this line, the compressor will "surge" or "pump". This is unstable operation, where the gas does not flow smoothly through the compressor, and is one limitation of the centrifugal compressor.

If the normal operating point is too close to the surge line, then reduced flows cannot be handled because the compressor would be in surge.

Characteristic curves . . . It is desirable to avoid what are called extremely "flat" characteristics, such as in Fig. 6. Here, for a given speed, a wide change in throughput covers only a very small change in compression ratio.

Suppose the compressor is operating at 90 per cent speed on the design point. If for some reason the suction pressure goes down, the compressor would be operating across a higher compression ratio. The operator may not have noticed this change immediately and the turbine is still running at 90 per cent speed. This means the compressor is passing a smaller amount of gas and is now in surge.

The characteristic should have, as a rule of thumb, 10-12 per cent difference in head between the normal operating point and the surge line.

Best efficiency . . . When the compressor characteristic Fig. 4 was picked for the hypothetical pipeline, the normal operating point was picked as the "design point." This means the compressor would operate at best efficiency for 600 M.M.s.c.f.d. flow. On many gas pipelines, however, operation varies a great deal between maximum flow and reduced flows. Will the compressor efficiency still be good at these other operating points?

Fig. 7 shows the selected compressor characteristic with approximate efficiency curves superimposed. Also the 670, 600 (normal), and 500 M.M.s.c.f.d. operating points are plotted on the curve. It is apparent that the best compressor efficiencies lie along the operating line.

Therefore, picking a compressor design point at the normal operating point makes the best use of the compressor from the point of efficiency, for most operating conditions. If normal operation occurs above or below the design point, many of the other expected operating points would be at poor efficiency.

So far, selection of only the first compressor in a station has been made. Because of higher suction pressures, the second and third compressors will each operate normally at a different cubic feet per minute. At normal 600 M.M.s.c.f.d. the second compressor has 650-psia inlet pressure which means approximately 8,800 cu. ft. per minute. The third compressor would operate at 770 psia inlet, or 7,500 cu. ft. per minute.

If the same compressor wheel were used for each of the three compressors, two of the machines would not be operating on the design point normally and poor efficiency and surge problems might result. Hence, an 8,800 cu. ft. per minute design-point wheel and a 7,500 cu. ft. per minute design-point wheel should be selected for the second and third machines respectively.

It should be noted that in many cases the design-point compression ratio is low, say 1.15. In this case cubic feet per minute into the first compressor inlet is not much greater than that into the third compressor inlet.

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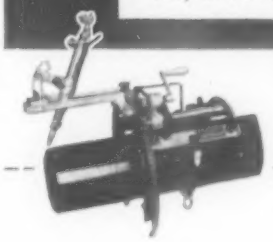

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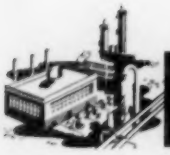

THE FOREMAN'S PAGE

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JOB IMPROVEMENT FOR THE PROCESS FOREMAN—1

The A, B, C's of Temperature and Heat

• This is the first installment in a series designed to help you, the process foreman, in your supervision of others, and to help you prepare for a better job. The series will deal with the fundamentals of processing and process equipment. We will continue to present the material in easy-to-grasp, question-and-answer style. THE FOREMAN'S PAGE will appear every week in the Journal.

Q. What is temperature and how do we measure it?

A. Often temperature is thought of as being a measure of a quantity of heat. Actually, temperature is a measure of the level or intensity of heat. For example, a match will supply enough heat to boil a drop of water, but it takes a good-sized gas burner to raise a gallon of water to boiling temperature within 5 minutes. The temperature in both cases is the same, but the heat supplied to the gallon is more than 75,000 times the quantity supplied to the drop. The temperature scale which we use is the Fahrenheit scale. On this scale, water freezes at 32° F. and boils at 212° F. at normal atmospheric pressure.

Q. What is a B.t.u.?

A. The term used to define a quantity of heat is the British thermal unit, abbreviated as B.t.u. The definition of this unit is "the quantity of heat required to raise the temperature of 1 lb. of water 1° F." As an example of the use of this unit, consider raising the temperature of 1 lb. of water from 112° to 212° F. Since 1 B.t.u. is required to increase the temperature of water 1° F. and we wish to increase the temperature 100° F., then 100 B.t.u.'s are required. If we wish to heat 10 lb. of water, 10 times as much heat is required, or 1,000 B.t.u.'s. If we wish to increase the temperature of 10 lb. of water 50° F., only 500 B.t.u.'s are required.

Q. What is sensible heat?

A. Sensible heat is the heat that is put into a liquid which causes a rise in temperature with no change from liquid to vapor.

Q. What is latent heat?

A. Latent heat is the heat required to change a liquid to a vapor with no change in temperature. Both latent and sensible heats are measured in B.t.u.

Q. What is heat of fusion?

A. The heat of fusion is the heat that is required to change a solid into a liquid.

Q. How can you demonstrate these concepts?

A. Water can be used quite easily to demonstrate sensible heat, latent heat, and heat of fusion. Ice is water in the form of a solid. Steam is water in the form of a vapor. Normally, of course, water is a liquid. Fig. 1 shows roughly that the heat input required to melt the ice at 32° F. is 144 B.t.u. per pound. The sensible heat required to raise 1 lb. of water from 32° to 212° F. is 180 B.t.u. The latent heat, or heat required to vaporize the water is 970 B.t.u. per pound of water vaporized. The same amount of heat (970 B.t.u. per pound) must be removed to condense the steam to water.

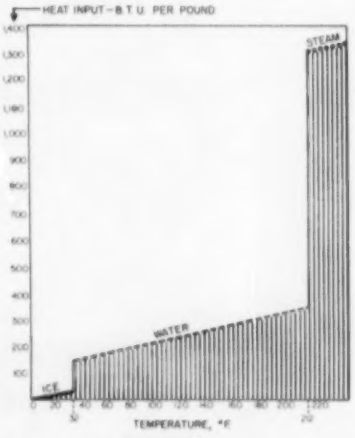


Fig. 1—The amount of heat required to convert 1 lb. of ice to 1 lb. of steam at one atmosphere.

Q. What is specific heat?

A. A certain amount of heat is required to raise the temperature of 1 lb. of water 1° F. A different amount of heat is required to raise the temperature of a pound of oil or some other substance 1° F. Water is taken as the basis for measurement. Specific heat is the ratio of the amount of heat required to raise the temperature of 1 lb. of any substance 1° F. as compared with the amount of heat required to raise the temperature of 1 lb. of water 1° F. For example:

1. 10 B.t.u. are required to raise the temperature of 1 lb. of water 10° F.
2. 7 B.t.u. are required to raise the temperature of 1 lb. of oil 10° F.
3. 7 ÷ 10 or 0.7 is the specific heat of the oil.

Heat Removal

Q. How is heat removed?

A. In processing operations, fractionating towers are quite common and of course they always have condensing or cooling equipment for the overhead stream. You see this type of equipment every day whether you are in gasoline, petroleum products, chemical products, or labora-

This material is taken from training program notes, Esso Standard Oil Co., Baton Rouge, La.; and from notes supplied by refining department, Phillips Petroleum Co., Bartlesville, Okla.

tory pilot-plant operations. Condensers or coolers are installed to lower the temperature of the overhead stream by removing heat. This is usually done by pumping cool water through a number of small tubes around which the overhead stream is moving. The quantity of water circulated, and the difference between the inlet and outlet temperatures, indicate the quantity of heat removed from the overhead stream by the circulating water. Since the temperature of the water leaving the cooler is always below its boiling point, the "heat pick-up" by the water is always sensible heat.

The overhead stream enters the condenser as a vapor and is cooled to the point where it condenses. Heat removed from the overhead during condensation is latent heat. After liquefying the overhead stream, further cooling is required to reach the desired product temperature. Heat removed at this point is sensible heat.

The above examples show how heat must be removed in oil and gas processing. Temperature also plays an important part in actual unit processes. It is one of the principal means of controlling our operations. Temperatures as low as —150° F. are used in the butyl rubber reaction to control the way in which the raw materials combine to form rubber. Temperatures as high as 1,000° F. may be used in cracking operations.

Q. What happens when mixing bodies of unequal temperature?

A. If 10 lb. of water having a temperature of 40° F. is mixed with 10 lb. of water having a temperature of 100° F., the temperature after mixing will be (40 + 100)/2 =70° F. This is so because the same materials are being mixed and it is not necessary to take specific heat into consideration.

However, if we put 10 lb. of copper having a temperature of 100° F. into a container holding 10 lb. of water having a temperature of 40° F., the resulting temperature will not be 70° F. This is because different substances have different specific heats. You recall that by definition "specific heat is the ratio of the amount of heat required to raise the temperature of 1 lb. of any substance 1° F. as compared with the amount of heat required to raise the temperature of 1 lb. of water 1° F." The specific heat of copper is 0.0951. The specific heat of water is 1.000. The final temperature of water after the copper has been placed in the container would be 45.2° F.

Table 1 gives the specific heats of certain liquids and solids.

You can see from this table why a silver or gold spoon will heat up so rapidly. While it takes one B.t.u. to heat up a pound of water 1° F., it will take only 0.0324 B.t.u. to heat up a pound of gold 1° F. or 0.0570 B.t.u. to heat a pound of silver. You can also see that a pound of alcohol will take less heat for each degree of temperature rise than will a pound of water. Mercury will heat up faster than the other liquids shown since it requires only 0.0333 B.t.u. to raise the temperature of 1 lb. of mercury 1° F.

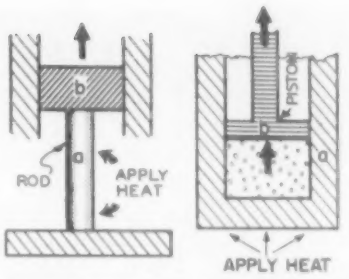


Fig. 2 (left)—As heat is applied to the metal rod, it expands and raises block b. Here heat has been expended and work done. Fig. 3 (right)—Here heat is applied to the use of cylinder a. As the gas confined below the cylinder heats up, it expands and forces the piston upward. The more heat expended, the more work done.

Q. What is the heat of combustion of a material?

A. This is the heat released when the material is completely burned. Some heats of combustion are listed below in Table 2.

Q. What is the relationship between heat and work?

A. Work may be done by expenditure of heat. Simple examples of how heat can do work are shown in Figs. 2 and 3.

The generation and use of steam is an excellent example of the conversion of heat energy into mechanical energy. Water is heated by the combustion of fuel until it is vaporized, forming steam. Heating of the steam is continued until the steam-generation system is under the desired operating pressure. In the refinery, the steam lines are operated at around 120 psig. This steam under pressure is either admitted into the cylinder of a reciprocating pump having a movable piston, or is directed against the turbine wheel of a centrifugal pump. In either case, it causes motion. This motion of force, resulting from the admission of steam, does work. In our case it operates the pump.

Still another example of heat doing work is the operation of an internal-combustion engine. A good example of the internal-combustion engine is the gas-fired compressor. Many of you are familiar with compressor operation. An automobile or the gasoline-powered lawn mower are still other examples.

In the operation of an engine of this type, fuel gas and air are admitted to the engine cylinder, compressed, and ignited. The common spark plug provides the source of ignition. The resulting explosion, due to rapid combustion, builds up a pressure in the cylinder that pushes the piston back. The force pushing the piston is the result of the conversion of heat energy from the burning fuel into mechanical energy that does work.

TABLE 1
(Liquids)

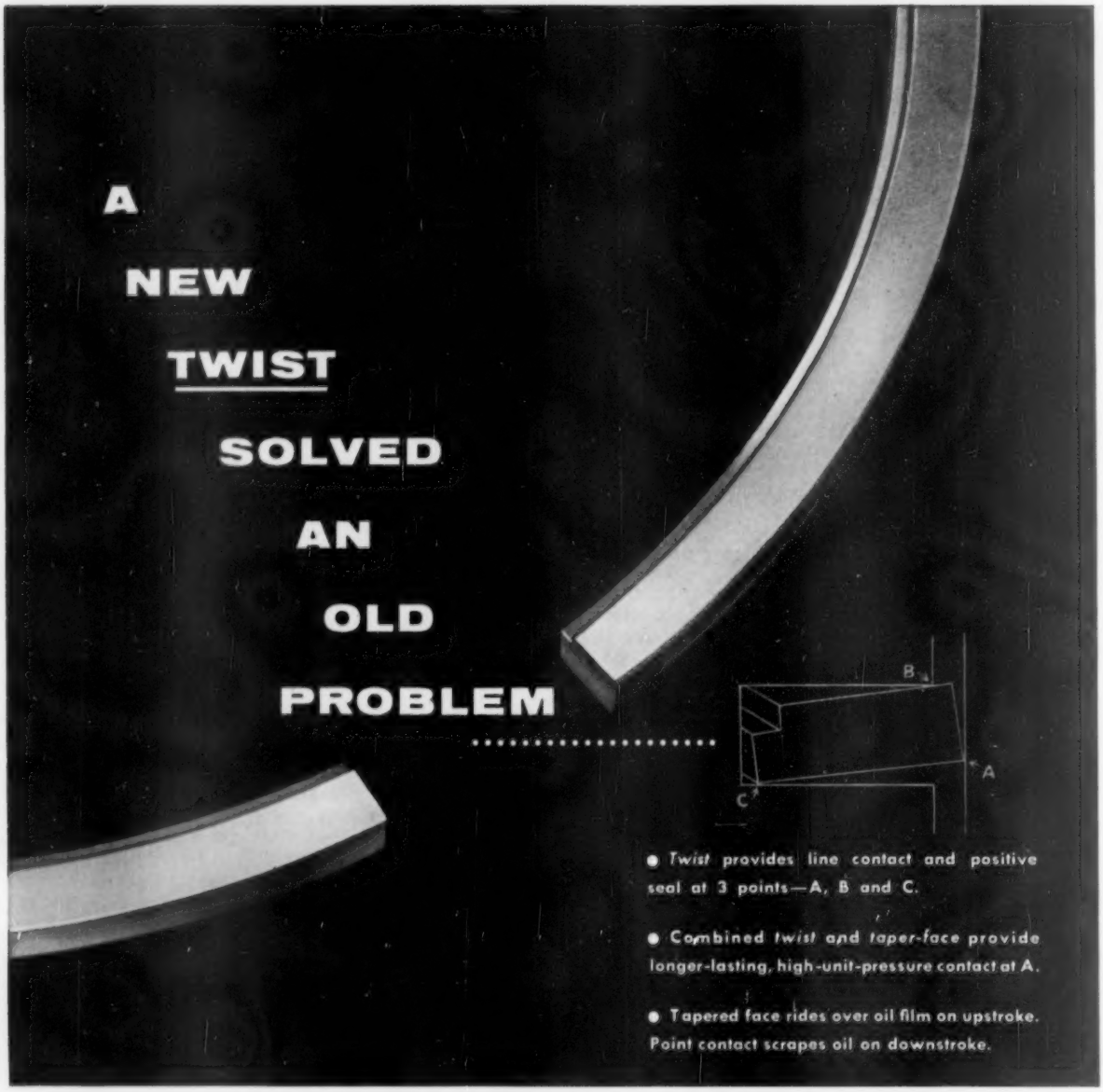
Substance	Specific heat
Water	1.0000
Alcohol	0.6200
Mercury	0.0333
Benzene	0.4500
Glycerin	0.5550

(Solids)

Substance	Specific heat
Copper	0.0951
Steel	0.1175
Aluminum	0.2143
Silver	0.0570
Gold	0.0324

TABLE 2
Heats of Combustion of Some Common Fuels
(Approximate Values)

	B.t.u.'s per lb.	B.t.u.'s per gal.	B.t.u.'s per 1,000 cu. ft. at std. cond.
Ethyl alcohol	11,900	78,800	
Anthracite coal	13,500		
Lignite	10,500		
Pine Wood	9,100		
Fuel oil	17,700	144,000	
Gasoline	18,900	115,000	
Butane	19,700	94,000	2,960
Methane	21,500		900
Hydrogen	51,600		270
Carbon to CO_2	14,500		
Carbon to CO	4,350		



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DRY INSTRUMENT AIR—8

Using a Continuous Dew-Point Recorder

by R. L. Dockendorff

IN our original planning, we didn't think it would be necessary to keep a constant check on the dryness of the air. Obviously, the rate of flow—particularly accumulative—was of interest if a breakthrough was to be avoided. But an initial verification of capacity and a periodic check on performance seemed to be enough. Actually, however, a continuous dew-point recorder was found to be indispensible.

Performance check . . . The performance of Baytown's units, rather than looking like Fig. 9 (Installment No. 5) proved to be like Fig. 14-a. This figure is a reproduction of a section of a typical dew-point chart on a dryer at Air Station No. 2. The measured dew point is the value at operating pressure. The characteristic rise during the daytime and drop during the night—with minor, if any, fluctuation at the 3, 11, and 7-o'clock shift change-over from cell to cell—is characteristic of a dryer operating well below its capacity but with some channeling.

Variation in inlet-air moisture shows up in outlet-air dryness. Air which is completely dried mixes with air which is only partly dry, and the average moisture content of the air leaving the dryer is unpredictable.

Channeling can be reduced by careful packing of the beds with desiccant particles closely graded as to size. This is partly defeated by fragmentation of the particles in use, which fills up some of the voids and gives the bed a variable permeability. Effects of channeling can be minimized when beds are long and narrow, and when intermediate open spaces are provided for flow equalization.

Test data . . . Fig. 14-b shows test data from the same dryer during about the same period. Dew points have been converted to the basis of atmospheric pressure. And all values are well below the design of 0°F. during this period. This indicates effective regeneration, but with outlet-moisture variations matching those in inlet-air moisture.

The accumulated water on the alumina, listed on a separate scale, shows that the loading per cycle is only 2.9 weight per cent water on the adsorbent compared to the design capacity of 7.7 per cent. So this operation does not approach a breakthrough. The alumina in this dryer had been in use about 1 year.

Eagleton and Bliss[5] have studied the breakthrough phenomena experimentally. They report that for air dryers where the inlet-moisture content does not exceed about 0.003 lb. of water per pound of air, the rate of mass transfer of water vapor from the air stream into the desiccant so limits the approach to equilibrium at all points in the dryer that even an ideal bed will exhibit an S-shaped breakthrough curve as shown in Fig. 9 (Installment No. 5). The curve is flatter at higher air velocities. With higher inlet-water contents, the curve is similar but less predictable.

Atmospheric air, saturated at 80° F., has a water content of 0.022 lb. per pound of air. When compressed to 100 psig. and cooled to 95° F., its water content is reduced to 0.0046 lb. of water per pound of air.

Baytown's drying conditions, then, are slightly outside the reported limits of this work. But our experience qualitatively confirms the basic facts of that work.

A more complete treatment of calculation methods for adsorption from a fluid stream flowing through a stationary granular bed is given by Hougen and Watson.[11] Their methods permit a calculation of the time-temperature-concentration-position relationship for such desiccant beds.

Author is with the engineering division, Humble Oil & Refining Co. at Baytown, Tex. Paper presented at Texas A. & M. process-instrumentation symposium at College Station, Tex., January 25-28, 1955.

References

5. Eagleton and Bliss; C.E.P. 49:543 (1953).
11. Hougen and Watson; C.E.P. 43:197 (1947).

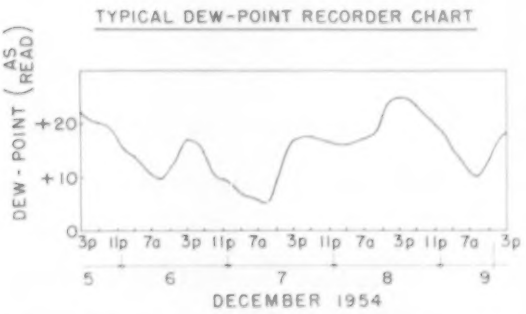

Fig. 14-a—How Baytown's units performed on a continuous dew-point recorder chart.

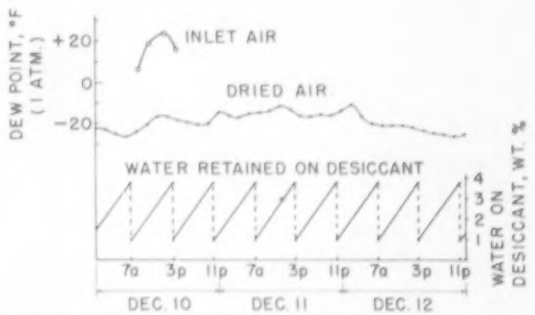

Fig. 14-b—Test data of a new dryer unit at Baytown's Air Station No. 2.

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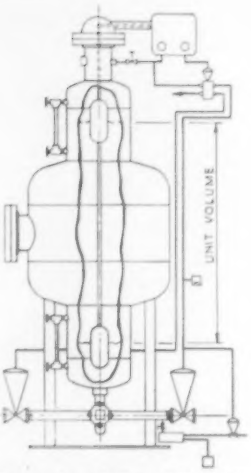

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QUESTIONS ON TECHNOLOGY

Value of Octane Number—Gasoline Prices

What is the cost of a unit of octane number? At what price should we sell straight catalytic naphtha mixed with polymer gasoline?—R.F.S.

The relationship between gasoline prices and their octane numbers has been fairly consistent for a number of years. This is indicated in Fig. 1 for Gulf Coast cargo prices. Note that the relationship is not really linear, that the straight lines of Fig. 1 are obtained by the use of logarithmic-like scales. At a low octane level, a unit of octane number is worth little, whereas in the range of 94-96 octane, a unit of octane number commands a high price. The approximate price (cents per barrel) of a unit of octane number is indicated in Table 1.

In general, a lead-free stock such as straight catalytic naphtha should sell at a slightly higher price than those of Fig. 1 or Fig. 2, because tetraethyl lead could be used at little cost to raise the octane number.

Although some regions, notably the East Coast, value octane number more highly than other regions, the main sources of supply are in substantial agreement in their appraisal of the value of octane number. This is illustrated by the Platt's "lows" (lowest bids) shown in Fig. 2. Too much curvature may have been indicated at the lowest octane ranges because the points plotted at 62 research octane number actually apply to 60 motor method and lower. If the gasolines marketed under this grade contain cracked gasoline, they will have research octane numbers higher than 62 which tends to straighten the curves.

Variations in the costs of a unit of octane number at various octane levels are indicated in Table 2.

TABLE 1—COST, CENTS PER BARREL, OF ONE UNIT OF RESEARCH OCTANE NUMBER
(Based on average Gulf Coast cargo prices)

Octane level	Motor gasolines					Aviation gasolines		
	1938	1947	1950	1952	Jan. 1955	1948	1952	Jan. 1955
75.0	1.09		2.44	2.40	2.31			
82.5	1.34	3.36	4.04	3.95	4.04			
87.5	2.27	4.62	6.05	5.3	5.88			
92.0		7.02	9.02	8.2	8.94			
95.0					14.3			
94.0						4.43	3.5	4.44
108.0						5.04	3.64	4.7

TABLE 2—COST OF A UNIT OF RESEARCH OCTANE NUMBER (JANUARY 1955), (CENTS PER BARREL)
(Based on Platt's lowest bids)

Octane level	Gulf Coast cargoes	Group 3	Kansas destinations	Oklahoma shipment	West Texas	East Texas (trucks)	California	New York Harbor
65.0		0.29	0.46	0.71	0.84	0.54		
75.0	1.47	0.97	1.05	1.51	1.60	1.26		
82.5	3.53	2.44	2.19	2.69	2.69	2.78	3.36	
87.5	5.96	5.64	5.72	4.71	5.13	5.55	6.15	8.09
92.0	9.35	7.25	12.83	8.72	8.3	9.55		16.2
95.0	14.3				12.6	14.7		
96.5	16.0							

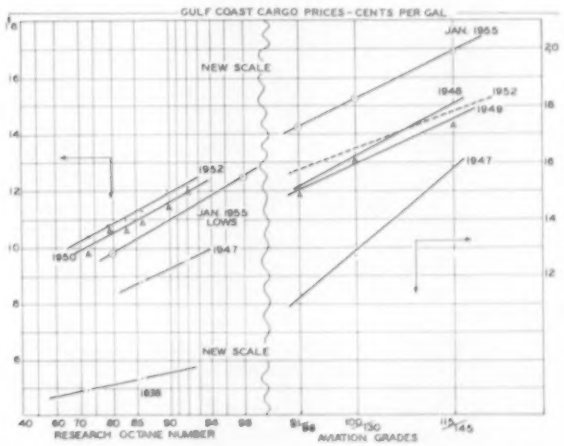

Fig. 1—Average gasoline prices (Gulf cargoes) as a function of octane number.

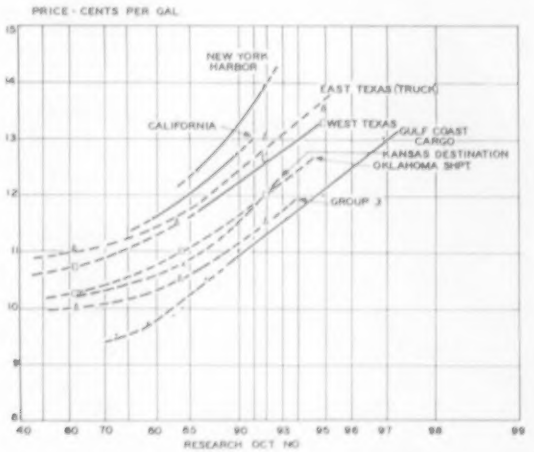

Fig. 2—Low-bid prices of gasoline (January 1955) as a function of octane number.

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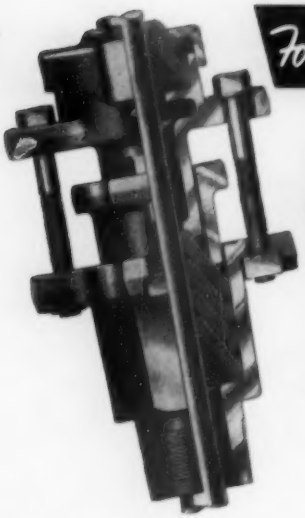

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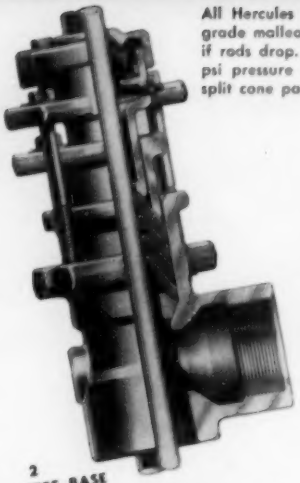

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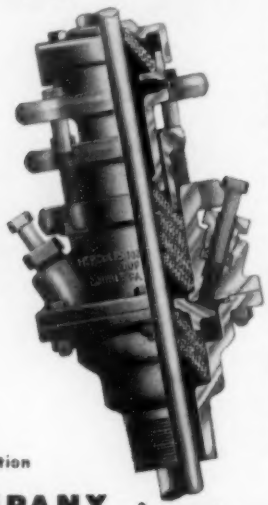

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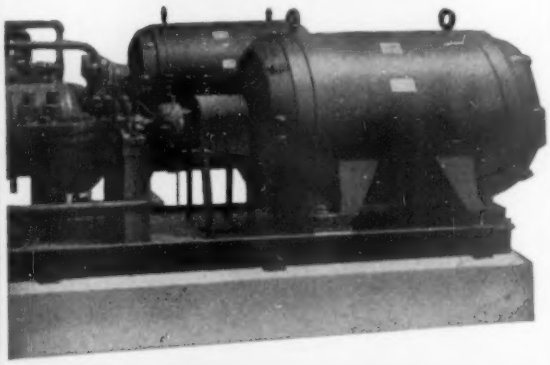

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Designing and Applying High-Speed Turbines—8

by H. Steen-Johnsen

THIS final installment on high-speed steam turbines deals with size, bearings, critical speed, erection, and operation.

Size of High-Speed Unit

When we look at the physical proportions of a high-speed unit, we find that they are quite different. Fig. 1 illustrates a 3,000-hp. for 400-psig. steam, noncondensing. The unit has four stages and the small casing diameter is dwarfed by the throttle valve and steam chest for 8-in. piping. The general arrangement of the unit is well pictured, the bearing case with the governor, the oil servo that moves the valves, the valve-lifting rods, and the throttle valve.

Sometimes the oil pump is direct-driven and located at the bottom of the governor shaft. Or it may be a centrifugal pump located directly on the turbine shaft. Or it may be a separate steam-driven pump on the oil tank.

The separate pump on the oil tank is used for installations calling for a wide-speed range. If we have a maximum speed of 10,000 r.p.m. and minimum speed of 6,000 r.p.m., the problem is that a direct-driven pump adequate for 6,000 r.p.m. would be too big at 10,000 r.p.m. Or, sized for 10,000 r.p.m., it would be too small at 6,000 r.p.m. and the auxiliary pump would cut in and out as speed was varied over the range. Hence, we prefer the separate pump on wide-speed-range jobs.

The general construction is illustrated showing the rotor in an open casing, Fig. 2. This a 2,000-hp. noncondensing turbine for a steam flow of 70,000 lb. per hour. The rotor is husky with heavy disks and shaft machined from one forging. The accessibility of the seals, bearings, and governor, and the heavy casing construction is well pictured.

Author is chief engineer, turbine division, Elliott Co., Jeannette, Pa. Paper presented at the last petroleum-mechanical engineering conference of the A.S.M.E. held at Los Angeles.

The assembly problem for such a high-speed turbine is the same as for any multistage turbine. Packing clearance must be large enough to prevent contact and small enough for minimum leakage. The balance of the rotor must be more accurate than for slow speed because the same unbalance creates a much greater force at higher speed. The best yardstick for permissible vibration is in terms of acceleration. If we allowed a vibration of ½ g., that would be an amplitude if 1 mil at 6,000 r.p.m. and roughly 2/5 mil at 10,000 r.p.m. It is well to check the rotor balance before it is bladed and then check as each blade row is added.

It is also well to weigh the blades before they are put in. Then, if there is any vibration, assemble equal weights diametrically opposite.

Bearings . . . On these high-speed machines, the question of bearings is

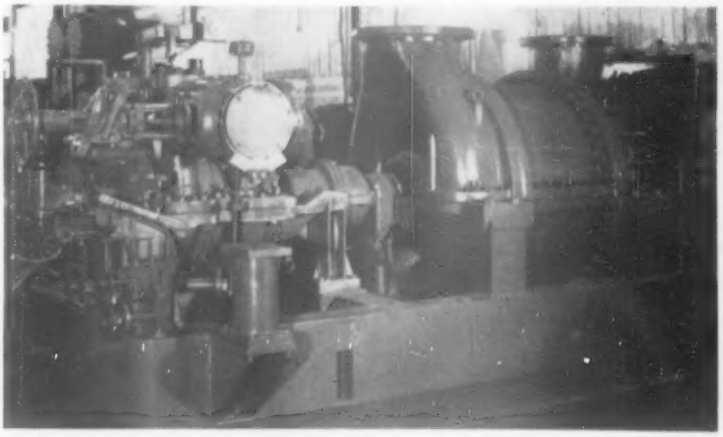


Fig. 1—Multivalve, four-stage, 3,000-hp., high-speed turbine and compressor assembly after test.

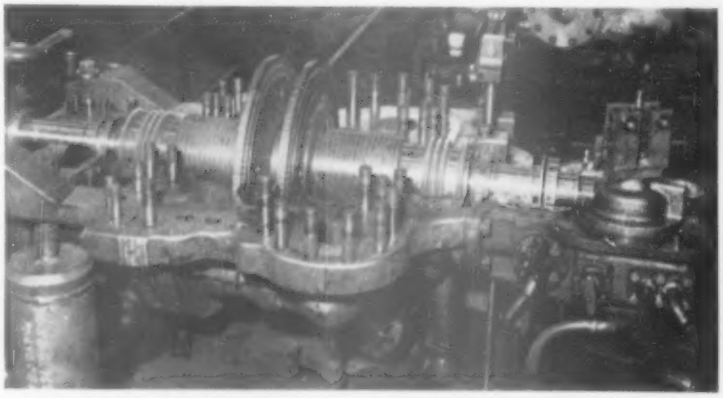


Fig. 2—Multistage, high-speed turbine showing rotor and casing assembly.

frequently raised. From experience it might be mentioned that they represent no particular problem. The journal bearings are short to allow high-end leakage, more oil flow, and adequate loading with the light rotors. Here again the high r.p.m. is not necessarily the correct criterion. Large standard-speed units are running at journal velocities of the same magnitude in feet per second.

The possibility of oil whip is present and seems to be handled best by watching the bearing load. With the short bearings, standard clearance can be used. The thrust bearing has increased feed and discharge and slightly increased axial float. But neither thrust nor journal-bearing loss seems to go up as rapidly as the increase in speed would indicate. That is, the losses are more nearly directly proportional to the speed than to the square of the speed.

Critical speed . . . The question of critical speed is always of interest to the compressor builder and user. Many of these high-speed turbines can be built so-called stiff shaft—that is, with the critical speed above the running speed. An extraction unit like this, however, becomes too long for that and the same applies to the unit with double-flow exhaust.

These machines accordingly will have critical speed below running speed which has been accepted practice on most drives in the standard speed range and on turbine generators. Where both the compressor and the turbine are flexible shaft, it is well to keep the critical speed of the two at least 5 per cent apart.

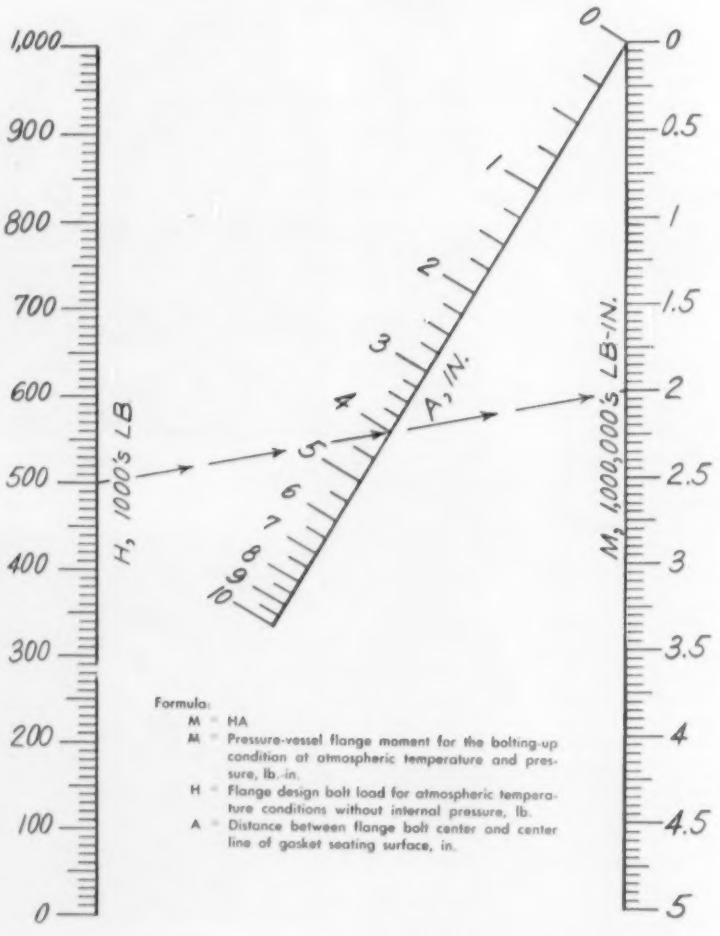
Erection . . . These high-speed machines require extreme care in erection because they are quite sensitive to both runout and misalignment. The light rotor at the high speed stores a lot of rotating inertia for its size and therefore a slight upset has large force behind it and can cause severe vibration. The casing must be supported solidly, with assurance that bearing alignment is maintained, and piping connections must be accurate to avoid casing distortion.

Alignment to the driven machines must be handled with care, and the erector and user should not have too much faith in the misalignment that can be absorbed by a flexible coupling. Also, most of the couplings are of the extended type. Using this type, the coupling hubs should be close to the bearing for minimum shaft extension and maximum length of the coupling spacer. If the coupling spacer is well balanced, this gives the best result because the spacer tends to rotate about its own center of gravity. Balance and precision manufacture of the coupling pitchline concentric with the bore are most essential.

Operation . . . Operation of these high-speed machines is not different from that of a standard-speed multistage unit. But it is different from the simple single-stage, mechanical-drive turbine. Like any multistage turbine with oil-operated speed-control system and force-feed oil to the bearings, there is a starting sequence that involves starting the auxiliary oil pump and oil coolers, and getting ready for operation.

Like any multistage turbine, the unit should be rolled slow to heat it uniformly and bring up vacuum before the unit is brought to speed. The main difference between a high-speed and a standard machine in operation is the high energy input relative to the physical size of the machine and, therefore, the rapid acceleration when coming up. On the other hand, this is not much different from the 3,600-r.p.m. turbine generator designed for high back pressure with a resultant light rotor.

This Nomogram Will Help You Determine Pressure-Vessel Flange Moment



Formula:

M = HA

M = Pressure-vessel flange moment for the bolting-up condition at atmospheric temperature and pressure, lb.-in.

H = Flange design bolt load for atmospheric temperature conditions without internal pressure, lb.

A = Distance between flange bolt center and center line of gasket seating surface, in.

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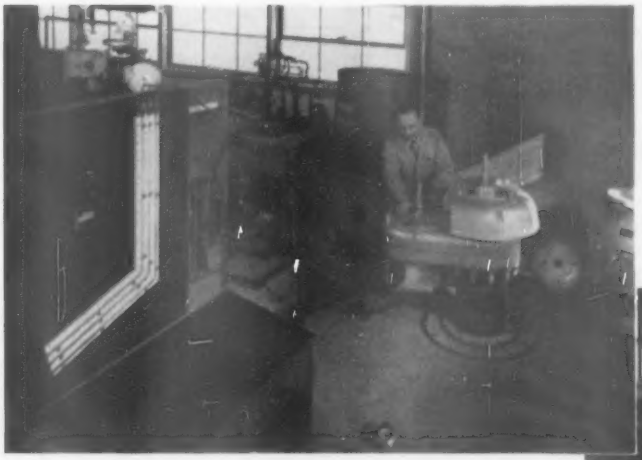
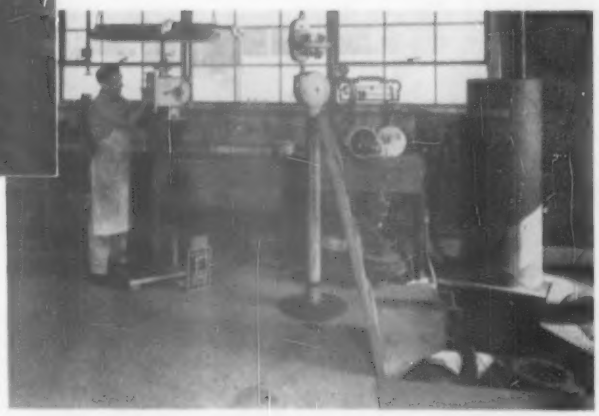
At the right is shown the Hydraulic Testing Section of the S&J laboratory. Here fluid handling equipment is tested for capacity to pass liquid and for head loss. The machine on the bench at the left of the picture is a high pressure hydraulic cycling device.



At the left is a section of the S&J laboratory with test tank and flow measuring apparatus for breathers, flame arrestors, vacuum and pressure relieving devices. The tank is built in strict conformity to API specifications.



At the right is shown the Automatic Tank Gaging section with a 25 foot gage-float testing well. Also included in the S&J laboratory is a chemistry section for corrosion studies and control, and for accelerated testing to simulate field conditions.

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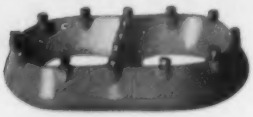

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Drilling Contractors

Wilson-Davis Drilling Co., Jackson, Miss., has a new contract operation under way in the recently opened Cooper Hill field, 3½ miles south of Cranfield, in eastern Adams County, Mississippi. It is the contractor's third test for the operator, John S. Callon, who discovered the field last February. Productive formation is in the Wilcox at 6,200 ft.

Sterling Drilling Co. is drilling for British-American Oil Producing Co. at a wildcat location 7 miles south of Matheson, in Elbert County, Colorado. Listing is for 1-G UPRR, in 27-11s-59w.

Allen Drilling Co., Wichita Falls, Tex., is contractor on a 3,600-ft. Travis Peak test being put down for Parks & Meabon, of Kilgore, Tex., a mile northwest of Urbana field, in Union County, southern Arkansas. Drilling is at 1 Gwin, in 4-18s-13w.

Baker-Taylor Drilling Co., Amarillo, Tex., has a new wildcat operation under way for Sharples Oil Corp. 6 miles northeast of Gruver, in Hansford County, Texas Panhandle. It is a 7,500-ft. Morrow sand test 1½ miles southeast of Tonkawa gas production and about 2 miles northeast of recently opened Morrow gas production. Location, 1 Steele, is in Section 78, Block 45, H&TC Survey.

Parker Drilling Co., Tulsa, has a rig working at a rank wildcat location in Wallace County, far-western Kansas. Contract is with United Producing Co., Inc., calling for a 5,400-ft. Mississippian test. Location, at 1 Fitzgerald, in 13-14-42, is 8 miles southwest of Sharon and 6 miles from the Colorado line. It is 55 miles from nearest production.

Newton Drilling Co., Coalinga, Calif., is drilling for Standard Oil Co. of California at a wildcat location northwest of Rosedale Ranch field, in Kern County, California. It is a projected 7,000-ft. test on Standard's North Lerdo lease. It is carried as 33-27 KCL, with location in 27-28-26.

West Central Drilling Co. is drilling a 5,500-ft. rotary test for General Crude Oil Co. in Motley County, in the northern part of District 8 in West Texas. The well is known as the 1 C. J. Soderstrom et al., 467 ft. from south line and 1,590 ft. from east line of the C. U. Soderstrom Survey 2, southeastern Motley County. It lies 14 miles east of Matador, Tex., and about 4 miles northwest of Sequoia 1 Wilie, rank discovery well for Wilie Flippen field in southwestern Cottle County, that county's first producer.

Livermore Drilling Co., Lubbock, Tex., has a new wildcat operation under way for Jack Markham and associates at 1 Pure-State, in 32-11-38, 7 miles northeast of Gladiola field, in northeastern Lea County, New Mexico. Hole is projected to 5,200 ft.

Halbert Drilling Co. has a new wildcat operation under way for H. S. Phillips and Sinclair Oil & Gas Co. in Cherokee County, East Texas. It is a 5,200-ft. Woodbine test at 2 Winshipp. Location is in the J. M. Fitzgerald Survey, 6 miles west of Jacksonville.

Crow Drilling Co., Shreveport, is drilling a 5,200-ft. Pettit test in Dorcheat-Macedonia field, Columbia County, Arkansas. The relatively shallow test, for David Crow, principal owner of the contracting company, is in the midst of a deep-producing area. Location is at 1-P Smith, in 17-18s-21w.

Trans-Era Drilling Co. is contractor for a 5,000-ft. rotary Mississippian test for Aurora Gasoline Co. in Kiowa County, western Kansas. The new start is the 1 Ahrens, NW NW NW 35-28s-18w. It lies 3½ miles southwest of Mississippian gas production in the two-well Brenham field and 4 miles northeast of Mississippian gas production in one-well Nichols field. It is located 2 miles southeast of Greensburg, Kans.

Ocean Drilling & Exploration Co. has contract for an offshore test for Shell Oil Co. in the South Pass Block 30 area off Plaquemines Parish, Coastal Louisiana, on the 1 State Lease 2666. The 13,500-ft. wildcat is 660 ft. south and west of the northeast corner of Block 30.

W. C. Fatjo Drilling Co. of Lafayette has been let contract by B&L Oil Corp. of Lake Charles for a 10,500-ft. deep test in Allen Parish's North Elton area, Louisiana. The 1 Hazel C. Rees et al. is in the northwest corner of 30-6s-3w. It spots on the south end of present production.

Superior Drilling Co. is contractor for a wildcat north of Boling produc-

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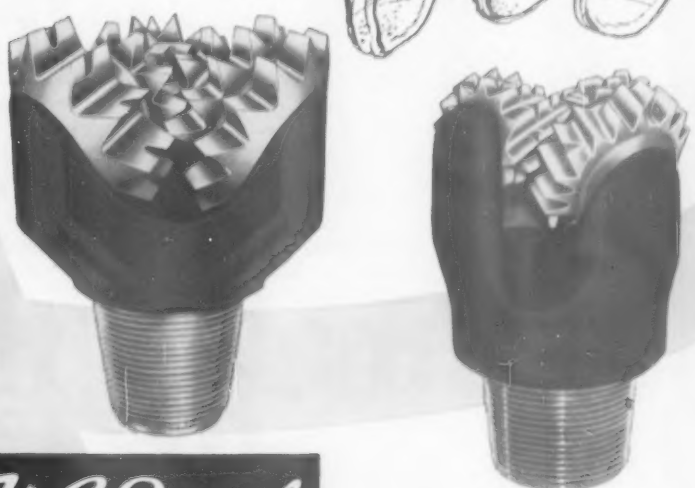

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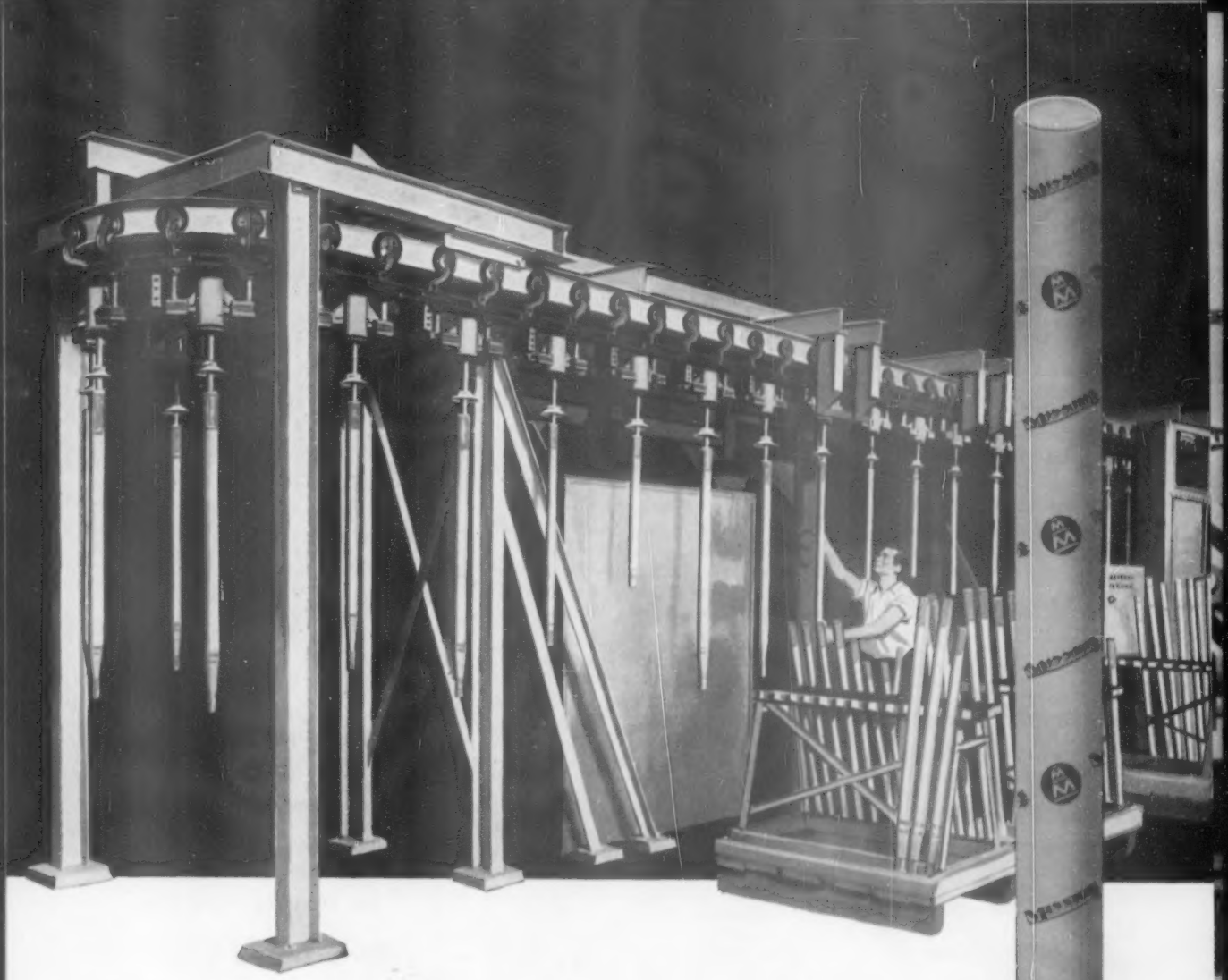

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tion in Wharton County, Texas. It is being drilled for Kilroy Co. of Texas, Inc. The 6,000-ft. wildcat, known as the 1 W. H. Banker et al., is on the John Huff League, Abstract 31, about 4 miles northwest of Boling townsite. It is about 2 miles from present production.

Keeton Drilling Co. is contractor for Armon E. Mabry's 2,500-ft. Gonzales County, Texas, wildcat, 1½ miles south of Gonzales townsite. The well is located on a 383-acre lease in the Benjamin Duncan Survey, A-20.

Kerr-McGee has been awarded contract to drill a new Gulf of Mexico wildcat for Pure Oil Co. at 1-A State Lease 1438, Block 99, 3 miles north of West Cameron Block 110 gas field off Cameron Parish, Coastal Louisiana. The 13,500-ft. test spots 660 ft. from south and west lines of Block 99, West Cameron area.

Pernie Bailey Drilling Co., Houston, has contract for an 8,100-ft. wildcat in Allen Parish, Louisiana. The well, 1 Bel Lumber Co., is located in 6-7s-6w, about 4 miles south-southwest of Kinder field.

Richardson & Bass are contractors for a wildcat going down to 13,500 ft. about 2½ miles northeast of East Golden Meadow field in Lafourche Parish, Louisiana. The well will be drilled for Natural Gas & Oil Co. of Shreveport as the 1 Lafourche Parish School Board. Location of the wildcat is 1,400 ft. from south line and 500 ft. from west line of 16-19s-23e.

H. L. Edwards Drilling Co. is contractor for a proposed 13,000-ft. confirmation try by Continental Oil Co. at 2-C Jeanerette Lumber & Shingle Co. The well will seek confirmation for new Little Bayou Pigeon field in Iberia Parish, Louisiana. It is the north offset to the discovery well, 1,980 ft. north and 660 ft. west of the SE cor. 2-12s-10e.

Offshore Drilling Co. has been let contract by J. Ray McDermott & Co., Inc., for a 15,000-ft. wildcat ¾ mile northwest of East White Lake field, Vermilion Parish, Louisiana. The test will be the 1 Felicie Gastinel et al., 8-15s-1e.

Field Drilling Co., San Antonio, has contract for a Continental Oil Co. 6,550-ft. wildcat in the Rincon field area of Starr County, Texas. The wildcat, A-130 T. B. Slick, is on a 5,377-acre lease in CCSD&RGNG Survey, Section 221, 20 miles northeast of Mission.

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MARSH ISLANDS were cut through by draglines to make miles of pipeline ditch for Interstate's new line.

OPEN WATER stretches between marsh islands were spanned with pipe laid in long sections by barge.

400-FT. SECTIONS of line were welded at once by joining three steel barges into one long work area.

RADIOGRAPHIC INSPECTION of pipeline welds insured a leak-free line before it was lowered into place.

Here are some of Interstate's experiences in

Pipelining through Louisiana's marshes

by Wayne T. Corley

BY adding 25 miles of 8 and 12-in. line, Interstate Oil Pipe Line Co. has extended its South Louisiana system to the edge of the Gulf of Mexico. Here it connects to a producing company's pipeline which brings oil ashore from producing wells in the Grand Isle, La., area. Interstate's line was laid in 1954 across some of the roughest pipelining country in the state.

Exploration, development, and production work in the area is slow and expensive. So is pipelining. Inland from the coastal and offshore producing areas are some 40 miles of scattered marsh islands and open stretches of shallow water. So pipelining must be done on a marine basis.

Author is division engineer, Interstate Oil Pipe Line Co., Shreveport, La.

The 25-mile line to Grand Isle is Interstate's first entry into this extreme southern area. It extends in a southerly direction from a point in Little Lake oil field east of La Rose, La., to the eastern tip of Grand Isle. Though it crosses some of the most difficult pipeline terrain imaginable, the line was completed in the average expected time.

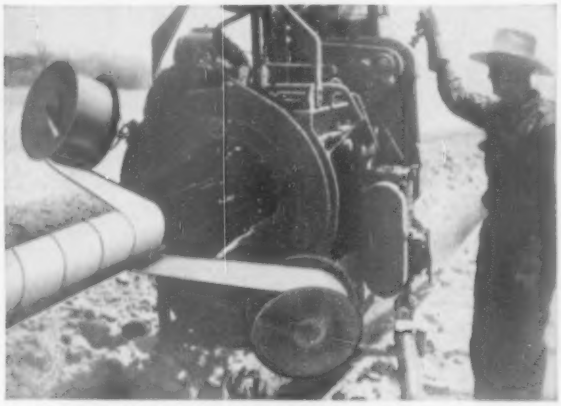
Route selection . . . Choosing a route for the line involved many days of intensive study. It included scouting, talking with land owners, consulting state and federal authorities, and working with local people in the fishing and oyster-raising business.

The line had to cross one of the most active oyster-raising areas in the state and every effort had to be made to minimize damage to these oyster beds. The first route selected crossed several large beds where damage due to laying the line would have been excessive.

After selecting and changing routes several times, the final route crossed only two beds and resulting damage payments were considered very reasonable. Interstate was helped considerably in this matter by retaining a native of

Mile after mile of NO-OX-ID protection assures long-term pipe service.

Cleaning and priming prior to coating and wrapping.



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PIPELINE PATROL

the area who was an oyster operator and thoroughly familiar with the business.

Ditching . . . Cutting a pipeline ditch through this quasiland area is entirely different from high-land operation. State and federal authorities required the pipe to be buried 3 ft. below stream beds or lake bottoms. This protects the pipeline from dragging anchors and allows shrimp boats to work over the line without fouling their trawls.

Spoil taken from the ditch had to be scattered over the lake bed and could not be piled more than 6 in. high in any one place. Rigid requirements like these required careful work when the barges carrying draglines started digging along a staked line across a 4-mile stretch of open water.

Water depths ranged from 3 to 8 ft. —one reason why the line had to be buried below the lake bottom. Marine equipment which barely clears the bottom could severely damage the line if it weren't buried. The deepest stream crossed was Bayou Rigaud which runs north of Grand Isle near Interstate's station and carries very heavy boat traffic. Spoil could not be left in the bayou, so a suction dredge was used to cut the ditch. It deposited the spoil on the pump-station site. A dragline walking on big wooden mats was used to cut ditch across the marshes. Some areas were so soft that pontoons were needed to keep the machine from sinking out of sight.

Retaining walls built . . . The real value of marsh land along the pipeline route cannot be reasonably estimated. It is safe to say that the land is very valuable for trapping muskrat and for possible oil production. To protect this land from erosion, Interstate erected long creosoted pile and timber bulkheads across the pipeline ditch at the edge of each marsh island.

INTERSTATE'S new line runs from Little Lake to Grand Isle, La., as indicated by the dotted line at right above.

Pipelaying . . . Laying operations for the line were done from three large steel barges. These were cabled together to allow about 400 ft. of pipe to be welded in one section. The pipe was placed on rubber rollers, lined up, welded, coated and wrapped, and finally pushed forward into the open water or marsh.

When properly located, the pipe was sunk into the ditch which had previously been cut some 5 ft. below the bottom of lakes and 5 to 6 ft. below the top of marsh islands. Two-thirds of the route, about 16¾ miles, was through open water. The balance crossed small and extremely mucky marsh islands.

No river clamps or other external weights were used on the line. The 8⅝-in., ⅜-in. wall pipe weighed 28.55 lb. per foot and settled immediately when shoved into the water. The 12½-in. pipe had wall thickness of ¼, ⅜, and ⅜ in., all of which would float.

The 12-in. was pushed in sections of about 3,000 ft. and the sections were

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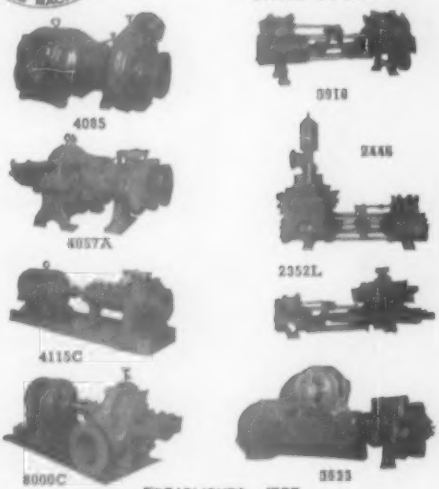

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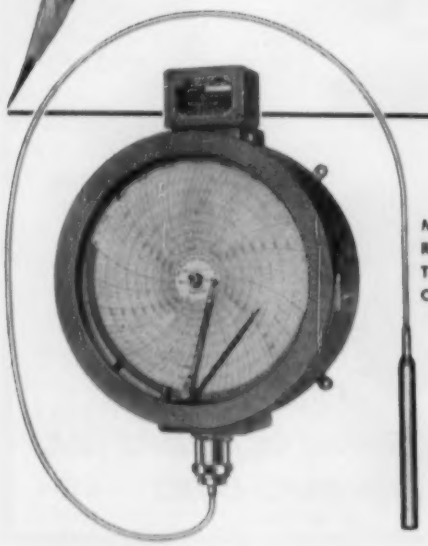

Model RVS Recording Temperature Control

"Here comes your QD Sheave — the original two-piece design."

TALK ABOUT

quick delivery . . .

. . . you haven't seen *anything* until you order a QD sheave or V-belt from your local Worthington distributor or supply store!

You'll get what you need — in exactly the right size — almost before you can say "Quick-Detachable"! (That means the Worthington sheave is easy to get on, easy to get off — but always tight on the shaft. It's the *original* two-piece sheave).

Call your Worthington man or supply store now. You'll see what we mean. MV.5.9

WORTHINGTON

Buy These Worthington Standard Products From Your Local Distributor

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then filled with water for sinking. The 8-in. was pushed in sections up to 1½ miles long and filled with water. Tidal action in this area could be expected to partially backfill the ditch to hold the pipe in place. The line-fill of water was used for hydrostatic-pressure test and then displaced with oil.

Standard pipeline construction practices were followed on the laying barges with one exception. For obvious reasons, yard-coated pipe was used instead of an "over the ditch" coating. Radiographic inspection was used to examine welds thoroughly and give maximum assurance of putting a leak-free line in the ditch. A leak discovered during hydrostatic-pressure testing of the line after it was in the ditch would be expensive to repair.

A leak after oil was pumped in the line would be a major and costly problem. In addition to the cost of repairs on the line, the damage to shrimping areas and oyster beds would be extremely costly.

Coating . . . A well-coated pipeline is a must in this area. Salt water, if allowed to come in contact with the pipe, can cause rapid corrosion. And the result would mean a high toll in oil loss, repair costs, and damages.

The pipe had been yard coated with coal-tar enamel and wrapped with saturated asbestos felt. On the barge it was carefully inspected with a holiday detector to find the smallest flaw. Any defect was immediately patched with an application of hot enamel coating and covered with a patch of felt. Very careful inspection was given to the coating of joints after welding was completed. This was the last point of inspection before the pipe was pushed off the barge.

Inspectors . . . Supervision and inspection responsibilities for the job were handled from Interstate's district office at Raceland, La. Six inspectors were used on the job. Two looked after piling and bulkhead installations while the other four watched over pipeline construction. An additional engineer was responsible for route surveys, maps, and other engineering problems involved in the construction work.

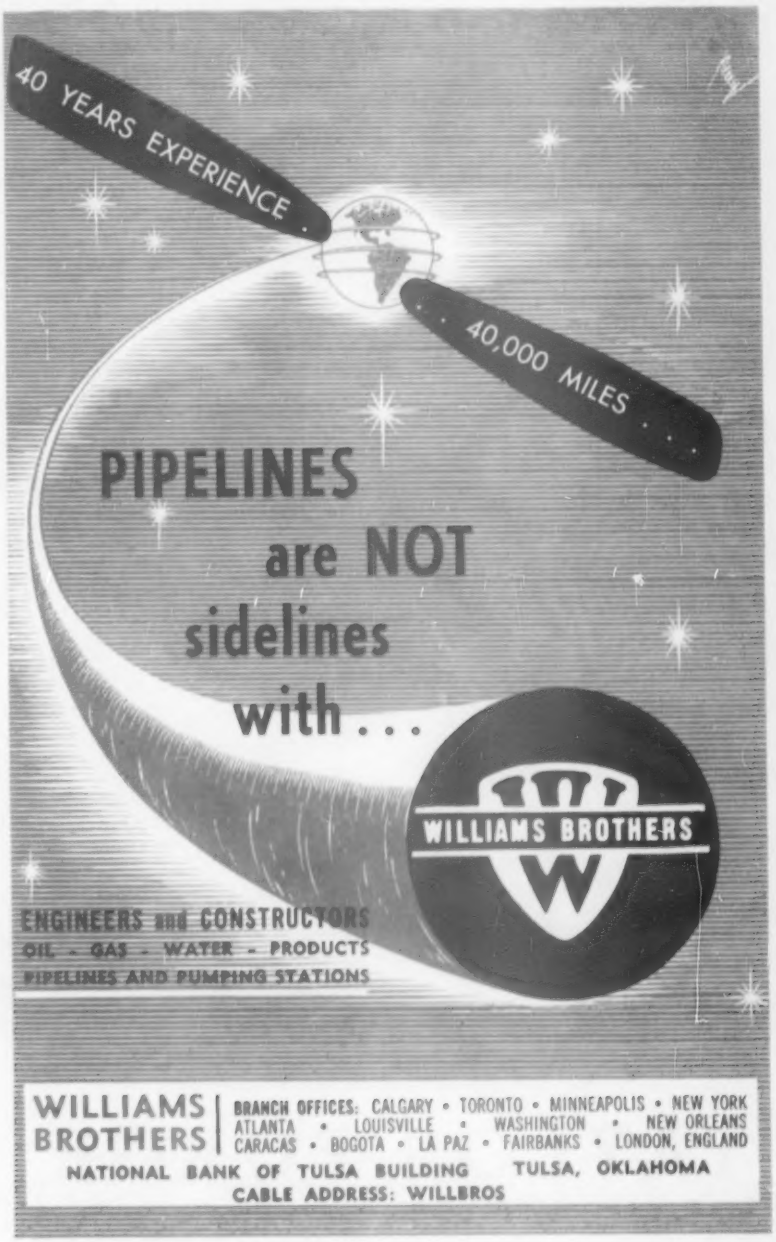
Interstate's personnel assigned to the job lived on Grand Isle for the first phase of construction. They later moved to Larose, La., to cut down on the long boat ride back and forth to the job site.

Weather . . . Many unusual and unforeseen conditions developed during the work. The line was laid during the storm season and this accounted for some anxious moments when two of the season's worst tropical storms blew in.

The contractor's personnel were living on a quarter boat near the laying barges in order to save lengthy boat rides. During one storm the anchor cable broke and the quarter boat was adrift for some 24 hours. It suffered quite a pounding but fortunately grounded on a small island and no one was injured.

A total of 73 days were required to complete the line, but 6 full days were lost because of rain or storms.

TO CHECK EROSION of the marsh islands crossed by Interstate's line, piling was driven to support retaining bulkheads.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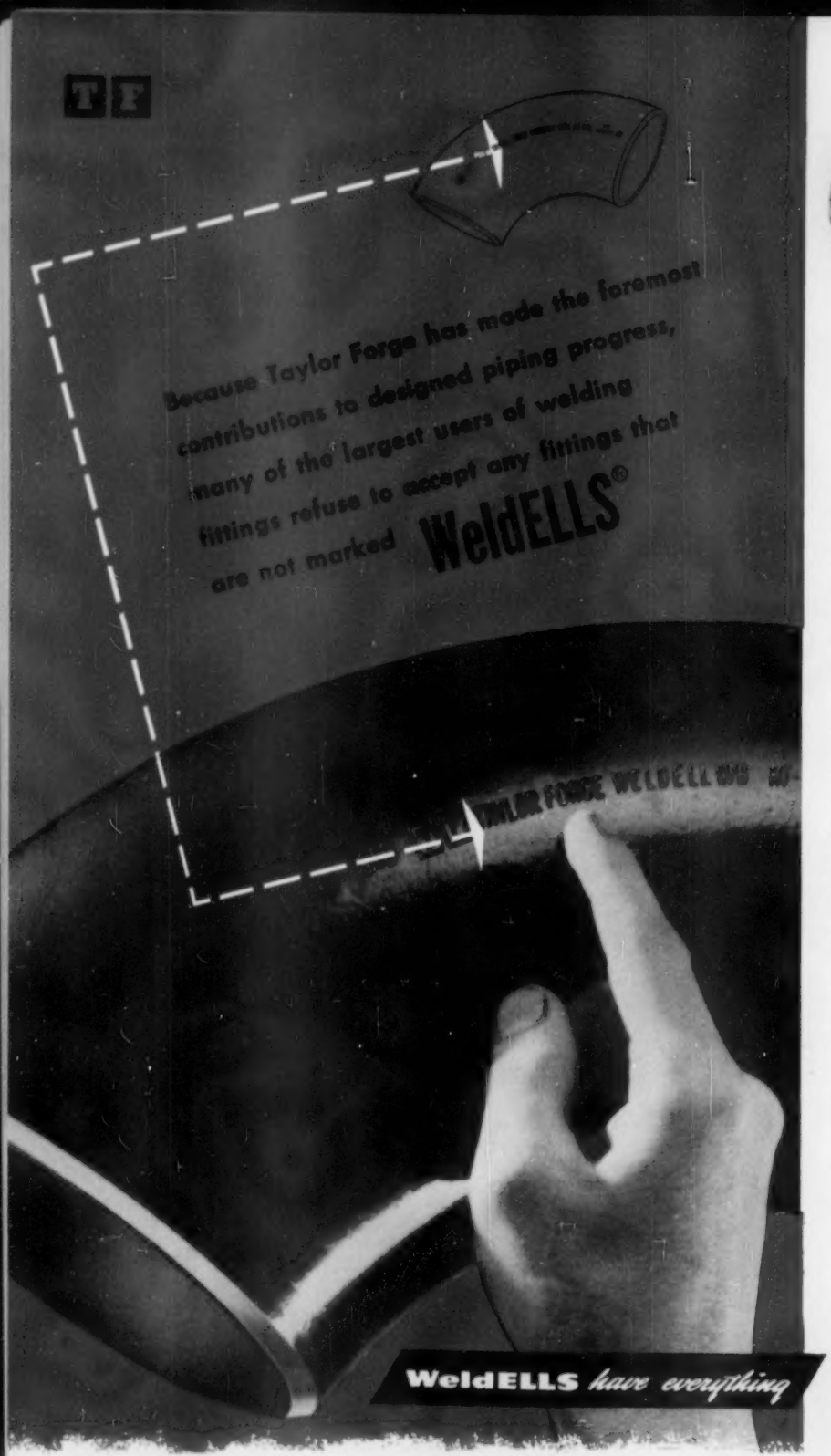
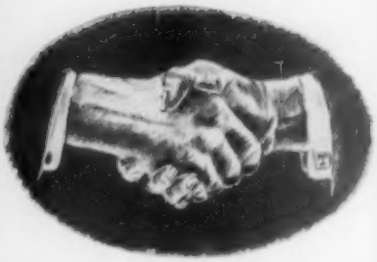

Because Taylor Forge has made the foremost contributions to designed piping progress, many of the largest users of welding fittings refuse to accept any fittings that are not marked WeldELLS®
WeldELLS have everything



Two men got together in 1912

They had probably looked a little farther into the future of piping practice than other engineers of their time . . . these men who met in the Spring of 1912. One was the late J. Hall Taylor, founder of Taylor Forge. The other was Charles Van Stone whose name was to go into most engineering handbooks as an engineering designation.

They were relatively young men, but they were old in piping knowledge and experience. Both had watched pressures rise from the old 100 lb. level to 125 lbs., and now it was pushing 150! For these mounting pressures Charlie Van Stone had questioned threaded fittings. Seeking something better, he had worked out his method of slipping flanges over pipe ends, then flaring out the ends and facing them so that the pipe-ends would make a good gasketed seal when the flanges behind the lapped ends were tightly drawn together by bolts.

The result was a strong, leak-tight joint . . . well attested by its acceptance ever since as the "Van Stone joint." But in 1912 it had a fault that Charlie Van Stone wanted to correct. He had been forced to use cast iron flanges. When the bolts were pulled up, the cast flanges, being brittle, often cracked. Van Stone had heard that this was the same trouble Taylor had encountered and overcome by developing strong, ductile flanges of forged steel.

He had heard correctly: within a few months Taylor Forge was producing a forged steel flange that was to make the Van Stone joint equal to any pressure then or in the years ahead. In its modern version—the Taylor Forge lap joint—it is one of the most effective connections for pressure piping.

It was this meeting that marked the transition of Taylor Forge from a small forge shop making flanges for our own consumption to maintained leadership in the forged flange field. In 1912 Charles Van Stone did not know that his name would become an engineering term, and J. Hall Taylor did not know that he was shaping the course of designed piping progress.

An episode in the story of Taylor Forge leadership in designed piping

See your Taylor Forge Distributor for up-to-the-minute facts.

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TAYLOR FORGE & PIPE WORKS • General Offices and Works: P.O. Box 485, Chicago 90, Illinois

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To The Oil and Gas Journal: Please send me further information, without obligation, on items of New Equipment or Bulletins I have checked (✓) from your issue of April 25, 1955

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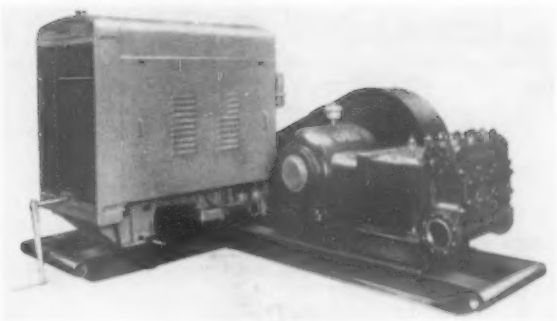
. . . What's New in Equipment?

Use the handy Time-Saver Cards ✓✓✓ to obtain additional information on these items

by Dan B. Miller



Gaso Pump Made for High-Pressure Work

The Gaso Series-3600 horizontal triplex plunger type pump has been designed as a rugged and dependable high-pressure pump for water-flooding, salt-water disposal, oil pumping, oil-well acidizing, crude-oil gathering systems, underground storage of petroleum products, cementing service, and formation fracturing.

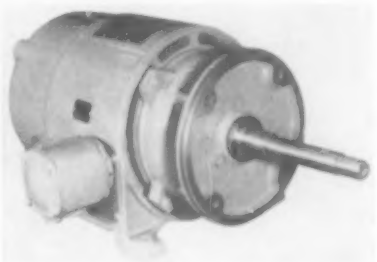
The pump has a 6-in. stroke and is available with either of two different fluid ends. The large-capacity fluid end, designed to take plungers with diameters of 2½ to 3½ in., will operate with pressures from 800 to 1,575 psi. The small fluid end is designed to take plungers with diameters of 1¼ to 2¼ in. It will operate with pressures from 6,250 to 1,935 psi. Either fluid end can be supplied in a variety of materials.

These pumps are available in complete skid-mounted portable pumping units with gas, gasoline, or diesel engines or electric motors of various makes to suit the customer's preference. *Gaso Pump & Burner Manufacturing Co.*

Check No. 1 On The Time-Saver Card

●

Totally-Enclosed Motors Made for Centrifugal Pumps



A new line of totally enclosed, explosionproof, close-coupled pump motors has been designed specifically for use with centrifugal pumps operating in dangerous, damp, or dusty locations. The new motors are available in horsepowers ranging from 1½ to 25.

Special features include: (1) a face-type registered mounting bracket for accurate shaft alignment and simplified pump mounting; (2) precision ground shaft for accurate pump-impeller mounting; and (3) solid flange and brass slinger for complete liquid deflection.

The totally enclosed models are completely sealed for use in locations where destructible dusts, acid fumes, excessive moisture, or other harmful substances prevail. Larger ratings are double-enclosed and fan ventilated for rapid heat dissipation. Smaller ratings are self-cooled by radiation.

The explosionproof models are certified safe by Underwriters' Laboratories, Inc. They are fitted with a sealed conduit box, elongated bearing sleeves, sparkproof aluminum fan, and long bracket registers.

The complete new line of pump motors has asbestos-protected windings, normalized castings, Lubriflush lubrication of bearings, and solid cast rotor. *U. S. Electrical Motors, Inc.*

Check No. 2 On The Time-Saver Card

●

Galvomag Supplies Current, Fewer Installations

Galvomag, a new magnesium anode material supplies 20 to 30 per cent more current than conventional magnesium anode alloys.

Magnesium anodes, because of the inherent electrochemical properties of the material, are used sacrificially to protect steel pipeline and other underground steel structures from corrosion.

Advantages of Galvomag anodes include fewer installations than anodes presently used, thus reducing total protection costs, and, because of the high potential of the material, better protection in the higher resistivity soils. *Dow Chemical Co.*

Check No. 3 On The Time-Saver Card

●

Power-Steel Wire Rope Has Greater Breaking Strength

Power Steel, a new grade of wire rope, is made of higher carbon wire. The new rope, furnished with an independent wire-rope core, has a breaking strength of about 24 per cent greater than tables show for standard Yellow Strand. Of this strength gain, 15 per cent is added by use of higher carbon wire and 7½ per cent by the independent wire-rope core.

Power Steel wire rope will withstand shock, resist wear, and is a heavy-duty crush-resistant rope designed for longer service. It is preformed and is recommended especially for drag lines, rotary-drilling lines, and other operations where great strength is required. *Broderick & Bascom Rope Co.*

Check No. 4 On The Time-Saver Card

What's New... Use the handy Time-Saver Cards

Geophysical Cable Excludes Moisture

Moisture in seismic cables causes cross-talk and electrical-leakage problems which interfere seriously with recording. Problems are eliminated in a new cable designed expressly for marsh and shallow-water use.

The cable conductors are sheathed in an extruded-Neoprene jacket which is pressure filled with oil. The oil occupies all of the annular space in the jacket and effectively prevents entry of water. *Vector Manufacturing Co.*

Check No. 5 On The Time-Saver Card

●

100-Ton Block Has Spring Duplex Hook

This fast-falling, unitized block-and-hook combination for tubing won't foul up and carries loads in perfect balance. Designed for the shortest over-all height consistent with safety, this block-and-hook combination is well within A.P.I. specification.

Heavy-duty antifriction bearings with individual lubrication are used throughout. The sheave pin is 5 23/32-in.-o.d. heat-treated alloy steel. Sheaves are 24-in. diameter, machined from high-grade steel, and grooved for ¾, ⅞, or 1-in. wire line. Where lighter weight is desirable, cast-steel sheaves are available on special order. Load capacity is 100 tons with a safety factor of 3 to 1 on yield point of material.

The block may be opened quickly for line changes or threading, and its design permits reeving lines without disconnecting the hook or laying the assembly on the floor. The spring duplex hook is engineered for space saving and safety, and it swivel locks in any one of eight positions. Spring travel is 5 in.; normal spring load is 1,350 lb.; and extended spring load is 2,250 lb.

Undue flexing and fatiguing of the hook under repeated heavy loads is eliminated. Breadth of block is 28 in.; width of block is 16½ in.; breadth of hook is 21 in.; and over-all height is 64 in. Approximate weight complete with solid-steel sheaves is 2,730 lb., or 2,280 lb. with cast-steel sheaves. *The Guiberson Corp.*

Check No. 6 On The Time-Saver Card

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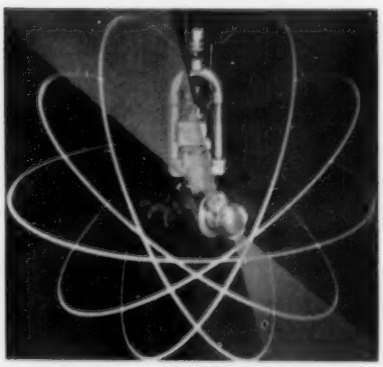

Tank Cleaner Has Rotating And Scrubbing Action

A new tank cleaner provides three-dimensional rotation of a high-pressure hydraulic jet. Designated as the Rotor Jet, this lightweight device delivers two powerful streams of hot or cold water, with or without detergents, over the entire inside surface of any tank.

Portability of the Rotor Jet enables one man to handle the entire tank-cleaning operation without assistance. The Rotor Jet is lowered through the tank access by means of its supply hose. Since the unit is completely controlled from outside, there is no need for workmen to enter the tank.

The mechanical movement of the Rotor Jet assures complete coverage. Cleaning speeds are fully adjustable, high speeds for light cleaning or rinse; slow speeds for heavy cleaning giving longer hydraulic scrubbing and greater heat transfer to the tank surface. The two jets, powered by a venturi injector, provide high-velocity streams so that a scrubbing rather than cascading action results. The jet head is rotated pneumatically, utilizing all hydraulic power for cleaning; none is lost to rotating power.

The Rotor Jet is available in three models for discharge capacities from 600 to 6,000 gal. per hour. *Sellers Injector Corp.*

Check No. 7 On The Time-Saver Card

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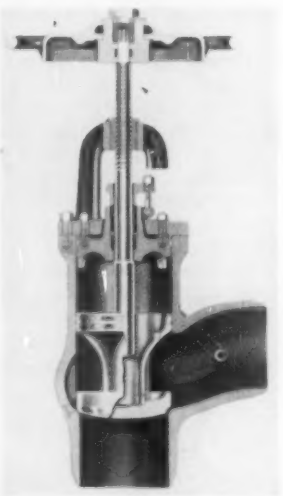
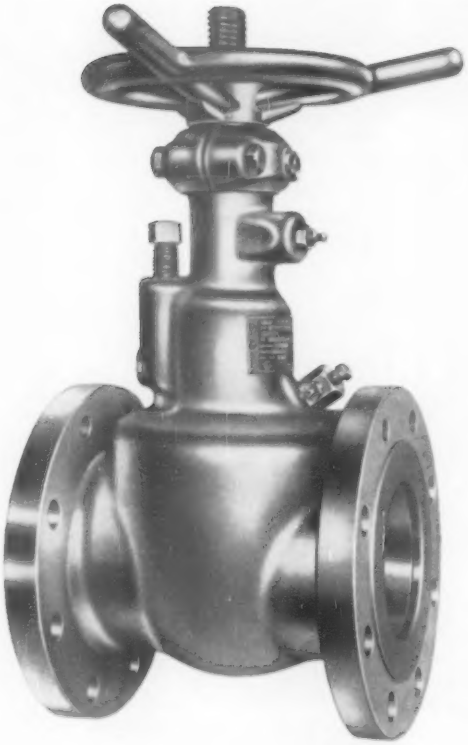


Edward Streamlines Inside Of 600-Lb. Valve Line

Improved internal streamlining, which lessens wear and reduces pressure drop, is featured in the redesigned 600-lb. line of globe-and-angle stop, check, and nonreturn cast-steel valves. Features formerly available only in the 900, 1,500, and 2,500-lb. valves, are now incorporated into the new 600-lb. valves to insure easier operation and cut down maintenance requirements. Included among these are swivel-disk construction, stellite-faced disks guided the full length of travel using integrally cast guide ribs, integral-stellited seats, and the Impactor hand wheel which is



MAXIMUM FLOW

characteristics

with MINIMUM pressure drops

ORBIT VENTURI VALVES

When you buy Orbit Forged Steel Venturi Valves, you can be sure that they are designed to give maximum flow characteristics with minimum pressure drops.

Three important features of the Orbit Forged Steel Venturi Valve design are:

1. *The tapered sections are smoothly machined and are gradual so as to eliminate serious frictional losses.*
2. *The diverging conical downstream passage reduces pressure drops to a minimum.*
3. *The entrance and exit walls of the conical sections are held at minimum angles.*

Orbit Venturi Valves are compact in design yet are built for continuous heavy duty service.

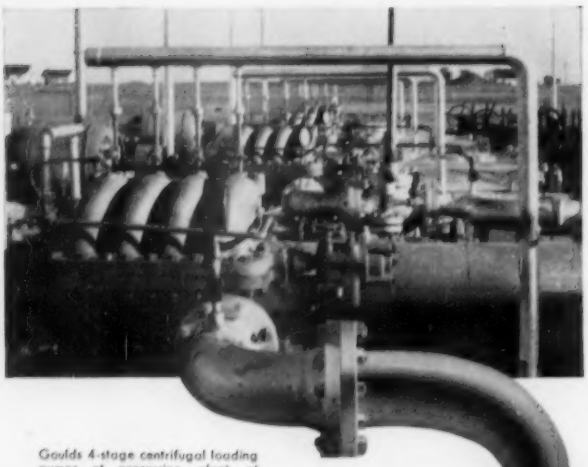
Available in flanged end only, ASA Class, Carbon Trim, Stainless Trim, Sizes: 2″, 2½″, 3″, 4″ and 6″, beginning with 150 Lb. Class.

Available also in Full Round Opening ASA Class, Sizes: 1″, 1½″ 2″, 2½″, 3″, 4″, beginning with ASA 300 Lb. Class. Screw and Flanged Ends.

ORBIT VALVES ®

ORBIT VALVE COMPANY

P. O. BOX 699 TULSA, OKLAHOMA



Goulds 4-stage centrifugal loading pumps at processing plant at Maysville, Okla.

Loading 250,000 gallons of LP-Gas products

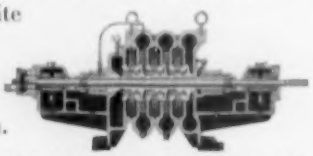
two miles away

Warren Petroleum Corporation chose four Goulds pumps for the loading work at the processing plant it operates in Oklahoma's "Golden Trend" area.

Day in and day out, for the past five years, these 4-stage 5" Goulds Fig. 3330 centrifugal pumps have pushed an average of 250,000 gallons of LP-Gas products daily through pipelines to truck docks adjacent to the plant and tank car loading racks two miles away.

This is an example of the thousands of liquid-handling jobs Goulds pumps are performing in the oil and gas industry. Goulds pumps are designed for easy maintenance. They're built to give years of uninterrupted, trouble-free service. And there's a Goulds pump for just about every pumping job.

Your Goulds representative will be glad to help you select the right model, size and construction for your needs. Or, write directly to our main office in Seneca Falls. Your inquiry will receive prompt attention.



Cross section of Goulds Fig. 3330 multi-stage pump, available in 21 sizes. For additional details write for Bulletin 722.1.

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Goulds PUMPS INC. Seneca Falls New York

Atlanta • Boston • Chicago • Houston • New York • Philadelphia • Pittsburgh • Tulsa

three times as effective as ordinary hand wheels.

In addition to these advantages, 600-lb. valves in sizes of 8 in. and larger also feature the improved pressure-seal bonnet joint which gives twice as much sealing force and three times as much sealing area. *Edward Valves, Inc.*

Check No. 8 On The Time-Saver Card

●

Pipe Heater Facilitates Field Stress Relieving

Preheating, postheating, and stress relieving of high-carbon-steel line pipe can be accomplished with this Hot-Foot pipe heater. The heater is for use on pipe where its chemical properties and temperature affect the pipe's weldability. Burner flame is adjustable to provide a wide range of temperatures. The machine is portable and can be operated by one operator. After the lineup has been made, this unit can bring the pipe up to the desired temperature for welding in a few seconds.

Four burners, mounted on a semi-circular ring, revolve around the pipe to provide uniform temperature. Fuel is supplied from small bottles of oxygen and butane mounted on top of the heater. Burner flame and burner distance from the pipe are adjustable. Fuel cylinders and burner ring are mounted on a small buggy, and adjustable wheels on the buggy facilitate mounting of the heater on various sizes of pipe. Burners are available in alloy steel or bronze. The heater is available in sizes for pipe diameters from 12 to 36 in. *M. J. Crose Co., Inc.*

Check No. 9 On The Time-Saver Card

●

Visible Wedge Valve Gives Impenetrable Shutoff

A new valve, which incorporates the impenetrable sealing action of a line

REAL EVIDENCE

B and W Scratchers remove mud cake, and here is how to prove it

1. Run B and W Scratchers on your casing.
2. Move the casing after it reaches bottom.
3. Circulate until returns from bottom reach the shaker screen.

B and W
Nu-Coil Scratcher

B and W
Rotating Scratcher

THERE IT IS! . .

You will see all the evidence you need to convince you that B and W Scratchers and Centralizers have conditioned the hole . .

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Well Completion Specialists

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Phone WE 6603

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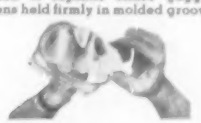
Even workers wearing glasses say they "never had it so COMFORTABLE!"

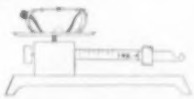
High flexibility
Pliable frame permits wearing for hours in comfort.

Easy-to-change lens
Replaceable lenses cut cost—no need to replace entire goggle. Lens held firmly in molded groove.



Wearing comfort
Channeled sides of frame give comfortable clearance over spectacle temples.

Light in weight
Can be worn all day without fatigue—encourage continuous protection.



Impact resistance
Pass recognized tests for impact protection as listed in Federal Specification GGG-G-531a, Goggles and Spectacles, all plastic, industrial.

Workers who wear prescription glasses—even big plastic frames—are mighty glad to get the extra roominess provided by NO. 90A MONOGOGGLES. Its greater clearance results in utmost comfort.

Exclusive Willson features described at left encourage workers to wear these sturdy MonoGoggles. Note how large flat .060 plastic lens provides "picture-window" scope of vision—how the deep, transparent light green frame admits side vision while eliminating glare.

Ask your Willson distributor to demonstrate its unique protection against light impact hazards like those found in spot welding, buffing, woodworking and chemical handling. You have a choice of ventilated or non-ventilated frames, clear or green plastic lenses. Bulletin mailed promptly on request.

Every exclusive feature in NO. 90A MONOGOGGLES® adds up to Lightweight Comfort — Extra Convenience — Superior Impact Resistance!

improved style by

More than 300 Safety Products Carry This Famous Trademark

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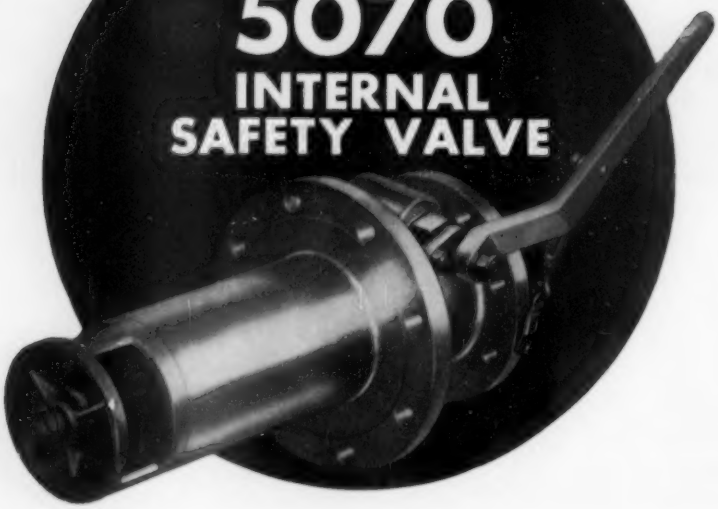
NEW!

"Varec"

5070

INTERNAL SAFETY VALVE



A quick closing emergency shut-off valve designed to automatically cut off flow out of tank in case of fire. Valve is spring-loaded and is held in open position by a fusible link which melts at 160°F. When this link melts, spring action completely closes the valve.

New features include:

1. VALVE CAGE WITH BOTTOM PORTION CLOSED TO MINIMIZE AGITATION OF SEDIMENT ON FLOOR OF TANK.
2. VACUUM BREAKER INCORPORATED IN PALLET FOR EASE OF OPENING.
3. OPERATING LEVER LINKAGE ARRANGED FOR POSITIVE MANUAL SHUT-OFF.
4. VALVE SEAT FACED WITH STAINLESS STEEL TO RESIST CORROSION.

Standard construction is steel body with bronze valve disc. May be mounted on standard A.P.I. or VAREC Fig. No. 308 Series Tank Shell Nozzles. Available with Series 15 or Series 30 Flanges. Available sizes: 4" x 6", 6" x 8", 8" x 10", 10" x 12" and 12" x 14".

"Varec"

VAPOR RECOVERY SYSTEMS CO.
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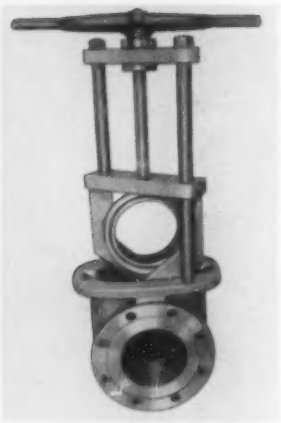


blind with the simple operation of a gate valve, is designed to permit full-view visibility of the wedge at all times. One glance determines whether the line is full open or full closed. The precison metal-to-metal fit of the wedge and seats, augmented by dependable seal rings, provides a foolproof line shutoff.

Valve seats are an integral part of the body. Both the wedge and the valve seats have stainless trim, forming an impervious barrier to corrosion. The operator has complete control of the wedge at all times. The wedge rotates at a touch. There is no lifting necessary to reverse the wedge.

The visible wedge is absolutely rigid. No line movement is necessary to open or close the valve. Handwheel operation enables operator to open or close line in less than a minute. *Hamer Valves, Inc.*

Check No. 10 On The Time-Saver Card

●

Monitor, Control Unit Is for Unattended Stations

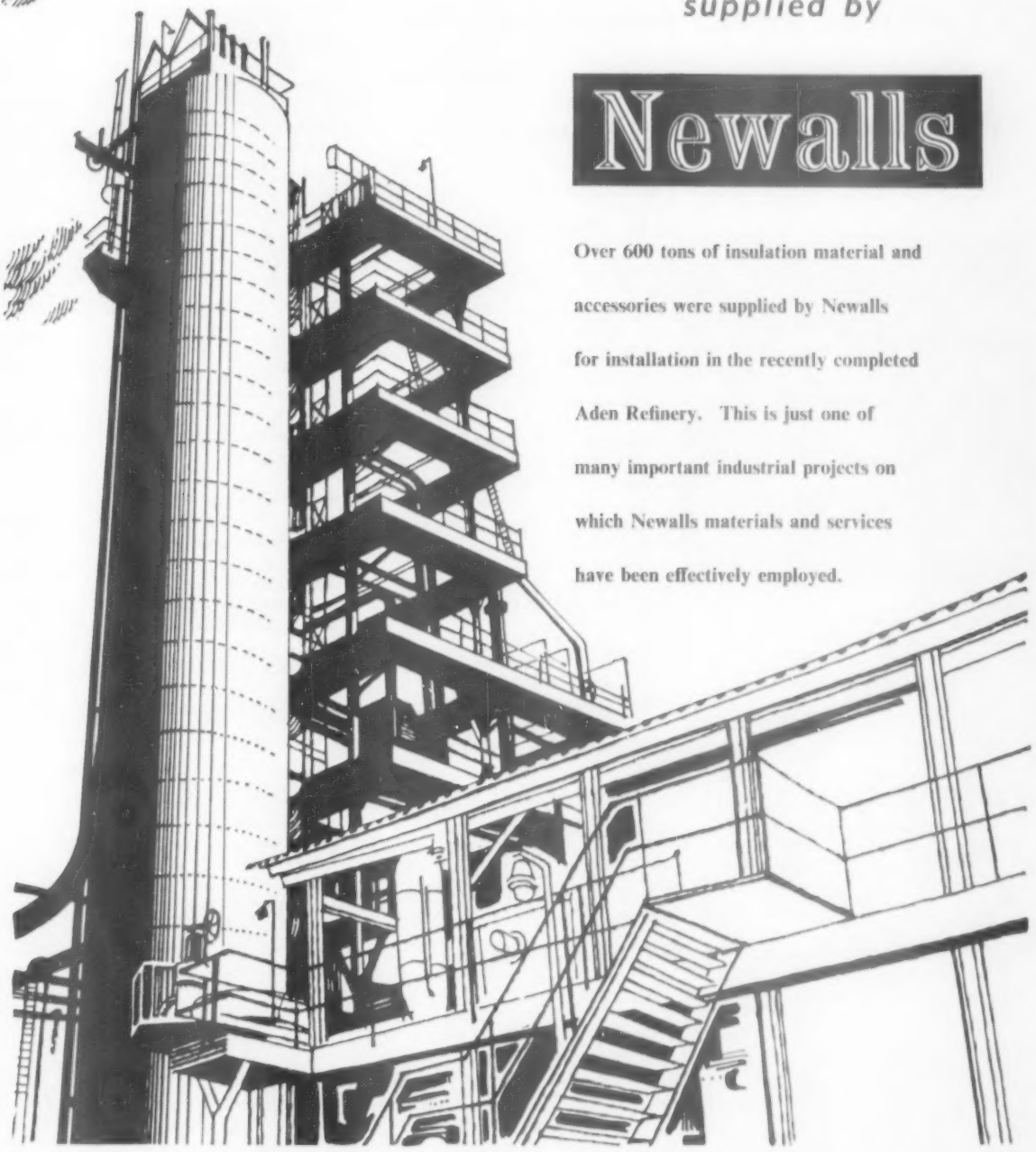
A remote monitor and control unit for unattended pump stations permits a pipeline dispatcher, using only existing telephone facilities, to make audible contact with a pumping station to determine the operating status of the pumping unit. He may also start or stop the pump motor with this remote unit.

The unit is easily installed on present telephone lines. It may be used for up to 125 stations on one pair of telephone lines. Its other advantages are that it avoids the delay and expense of manual operation, allows the dispatcher to start or stop any station immediately when an emergency occurs, and has a very low maintenance cost. *Nelson Electric Manufacturing Co.*

Check No. 11 On The Time-Saver Card

Insulation material used in the Aden Refinery was supplied by

Newalls



Over 600 tons of insulation material and accessories were supplied by Newalls for installation in the recently completed Aden Refinery. This is just one of many important industrial projects on which Newalls materials and services have been effectively employed.

NEWALLS INSULATION COMPANY LIMITED

Washington, Co. Durham, England

A member of the TURNER & NEWALL ORGANISATION

Offices and Depots at LONDON, GLASGOW, MANCHESTER, NEWCASTLE UPON TYNE, BIRMINGHAM, BELFAST, BRISTOL & CARDIFF. Agents and Vendors in most markets abroad.

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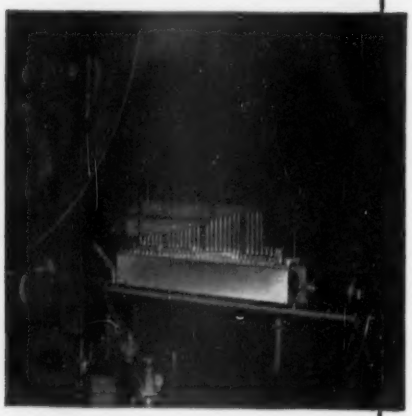
FORCE-FEED LUBRICATION

Pressure Application—Exact Amounts—Accurately Timed

ENGINEERED TO THE SPECIFIC NEEDS OF THE OIL AND GAS INDUSTRIES



Manzel Force Feed Lubricators in various models are available with from one to 30 feeds and for operation against discharge pressures of up to 30,000 PSIG. They can be engineered into your new equipment or installed on that already in service.

For dependable, automatic lubrication under pressure, Manzel Force Feed Lubricators deliver exactly the right amount of lubricant, to exactly the right places, at exactly the right times. They cut labor — reduce oil consumption — and prevent costly breakdowns.

Manzel has had vast experience in meeting the specific needs of the oil and gas industries. When you have lubrication problems, call Manzel.

AND CHEMICAL FEEDERS, TOO

Manzel also produces Chemical Feeders with capacities from a few drops to 60 gallons per hour. Whatever your needs Manzel can fill them with equipment that is sturdily built, simply designed and completely dependable.

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They're NEW

- Bulletins
- Catalogs
- Brochures

for your copy, check ✓ ✓ the Time-Saver Cards.

Automatic R. V. P. Recorder. Brochure No. 725 describes the automatic Reid-vapor-pressure recorder manufactured under licensing agreements with Standard Oil Co. (Ind.). The eight-page illustrated brochure discusses the time and cost-saving advantages to refineries using the unit to monitor the butane content of motor gasolines during blending. *Precision Scientific Co.*

Check No. 12 On The Time-Saver Card

●

New Fluid Cracking Catalyst for Petroleum Refiners. A new high-alumina catalyst, which has proven its ability to produce more gasoline and other petroleum end products per pound of catalyst used than has hitherto been possible, is detailed in an evaluation report. The new catalyst is described as containing 25 per cent alumina by weight as compared with the 13 per cent content normally used in synthetic cracking catalysts of this type. It has been subjected to both commercial and pilot-plant evaluation since February 1952 at the Houston refinery of Shell Oil Co. *American Cyanamid Co.*

Check No. 13 On The Time-Saver Card

●

Stainless-Steel Tubing for Heat Exchangers and Condensers. Two typical specifications — A.S.T.M. A-249 and A-269—covering this grade of tubing have been broken down paragraph by paragraph to show how tubing is processed to meet each requirement in the specifications. Photographs are used showing various production operations in accordance with specifications. *Republic Steel Corp.*

Check No. 14 On The Time-Saver Card

●

Challenger Crawler Tractors. Publication No. 2863 covers the Fowler Challenger 1, 3, and 4 crawler tractors together with accessory equipment such as winches, side booms, and dozers. Drawbar-pull ratings on these units range from 10,000 to 28,500 lb. Information covered on each unit includes engineering data on the engine, over-all specifications, and shipping

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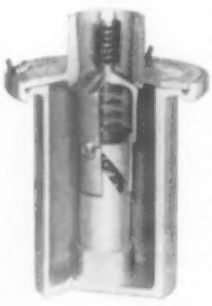
"LITTLE SQUIRT" SUCKER ROD BOX CLEANER

Hydraulic Device Reduces Joint Failures. Cleans Sucker Rod Boxes or Couplings while Sucker Rods are being run in the well.



Brushing motion plus hydraulic flushing action removes sand, grit and other foreign matter from sucker rod couplings while rods are hanging in derrick or mast.

HHM PRODUCTS
SOLD THROUGH SUPPLY STORES
Box 5319 Donaldson Station
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specifications. *John Fowler & Co. (Leeds) Ltd.*

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●

Tubes and Plates for Condensers and Heat Exchangers. Publication B-2's 44 pages cover: (1) applications; (2) condenser-tube alloys; (3) plates for tube sheets and baffles; (4) manufacturing methods; (5) installation data; (6) operational factors affecting tube life; (7) corrosion factors; (8) physical properties and tabular data; (9) and other Anaconda products. *The American Brass Co.*

Check No. 16 On The Time-Saver Card

●

Valves and Fittings for the Oil and Allied Industries. Engineering drawings and data tables are featured on wedge gate valves, swing check valves, globe valves, gage valves and cocks, drain cocks, level indicators, and safety valves. *Sidney Smith & Sons.*

Check No. 17 On The Time-Saver Card

●

Pneumatic Control and Transmission Systems. A new handbook-type bulletin on pneumatic control and transmission systems describes pneumatic controllers, their applications, and how they work. Bulletin 1120 also describes pneumatic-transmission systems and cascade, ratio, and other interconnected control systems. *Minneapolis-Honeywell Regulator Co.*

Check No. 18 On The Time-Saver Card

●

Petroleum Processing. Bulletin No. 103 depicts the services and facilities offered by Kaiser engineers in preparing engineering and economic-feasibility reports, market and site-location studies, and evaluation reports. Services include complete engineering studies, design facilities, and contract construction. *Kaiser Engineers.*

Check No. 19 On The Time-Saver Card

●

Single-Stage Steam Turbines with steel-casing construction are described in bulletin 1954C. A cutaway view of a typical unit is shown which points out and describes the standard features. These Worthington single-stage turbines are used in driving boiler-feed pumps, forced or induced draft fans, and other equipment, where simplicity of construction and reliability are prime factors. Information on the availability of various frames for single-stage applications, details on variable speed governors, and other features are included. *Worthington Corp.*

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SAFETY WHEEL WRENCH

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Will fit rods from ½" to 1¼". The jaws are hardened.

For safety reasons be sure to use hub bolt for sanded up jobs.

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*TAFT, CALIF.
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* Calif. Rep. Emsco Mfg. Co.

EQUIPMENT MEN . . . in the News

Baker Continues to Hold Area Sales Meetings

Baker Oil Tool, Inc.'s sales and service personnel have recently completed sales meetings in principal oil centers throughout the country. Meetings were held at Corpus Christi, Tex.; Oklahoma City; and Evansville, Ind. Sales meetings had already been reported in Shreveport, La.; Midland Tex.; and Great Bend, Kans. At Corpus Christi were, front row; N. H. Lytton, district manager, Southwest Texas; G. A. Sullivant, district manager, Texas Gulf district; P. E. Hilton, manager, sales and service, Central division; R. W. Henderson, vice president and assistant general manager; G. D. Hall, assistant manager, Central division; C. A. Greve, division staff engineer, Houston; G. M. Anderson, division staff engineer, Houston.

Back row, are: H. B. Edwards, branch manager, Falfurrias; R. W. Jones, branch manager, Freer; P. E. Laake, branch manager, Luling; M. C. Muckleroy, branch manager, Corpus Christi; W. M. Swafford, branch manager, McAllen; R. Wilder, Jr., service engineer; D. C. Lewis, branch manager, El Campo; J. N. Berry, branch manager, Victoria; L. V. Rydzeski, Houston.

Attending Baker's Oklahoma City meeting were, front row: R. C. Glover, foreign and domestic sales engineer, Tulsa; E. F. Hannon, Jr., district manager, Mid-Continent district; T. J. Singley, district manager, Eastern district; P. E. Hilton; V. L. Taylor, secretary, Oklahoma City; R. W. Henderson; G. M. Anderson; C. J. Berlin, division sales manager, Dallas; G. W. Mitchell, district manager, Kansas district.

Back row, are: J. F. Townsend, division staff engineer, Oklahoma City; F. L. Scott, purchasing agent, Houston; W. W. Farrar, branch manager, Wichita Falls; E. E. Benninger, export representative, New York; G. E. Diggs, division staff engineer, Oklahoma City; J. P. Gallagher, branch manager, Gainesville; K. E. Hawkins, branch manager, Oklahoma City; E. W. Johnson, branch manager, Duncan; R. F. Walker, staff sales engineer, Houston; S. B. Howard, personnel manager, Houston; W. R. Gamble, branch manager, Hominy; R. C. Finley, branch manager, Seminole.

At Baker's Evansville meeting were, front row: G. M. Anderson; T. J. Singley, district manager, eastern district; P. E. Hilton; J. Gordon, secretary, Olney; R. W. Henderson; R. C. Glover. Back row, are: W. W. Wilson, branch manager, Parkersburg, W. Va.; G. E. Diggs; H. A. Hawkins, branch manager, Olney; S. B. Howard; R. A. Cheyney, branch manager, West Branch; W. G. Harness, branch manager, Carmi.

Franks Manufacturing Sold to Cabot Shops

Early this month Carl White, Jr., president of Franks Manufacturing Corp., Tulsa, and R. A. Baker, vice president and general manager of Cabot Shops, Inc., Pampa, Tex., jointly announced the sale of Franks Manufacturing to Cabot Shops.

Baker will become president of

R. A. BAKER CARL WHITE, JR.

Franks Manufacturing in addition to his present position with Cabot Shops. White disposed of his holdings, representing the bulk of Franks outstanding stock. But he will continue his association with Franks Manufacturing in an advisory capacity.

No changes were made in Franks' executive, engineering, or sales departments.

Cabot Shops is a subsidiary of Godfrey L. Cabot, Inc., Boston.

Franks Manufacturing pioneered in the development of portable well-servicing units, drilling rigs, telescoping derricks, and other mobile equipment used in drilling and maintaining wells.

Dixon Appointed to Tulsa Cooper-Bessemer Office

The assignment of Donald E. Dixon to Cooper-Bessemer's Tulsa office as field engineer has been announced by R. F. Lay, general sales manager of Cooper-Bessemer.

D. E. DIXON

Dixon will handle both application and sale of pipeline engines and compressors for the petroleum and chemical processing industries in Oklahoma. He will work under Byron L. Potter, Cooper-Besse-

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FITTINGS of the Highest Quality

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Before any Larkin Fitting leaves our plant, it has undergone more than 16 separate manufacturing and inspection operations. After forging, Larkin Fittings receive careful descaling, threading, chamfering, beveling, coating, labeling and packaging. In between each operation is a step-by-step inspection. And there are no short-cuts. That's why you can be sure that every Larkin Fitting is highest quality . . . the best that modern manufacturing and careful workmanship can produce. Specify Larkin through your supply store.

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Hexagonal Swages and Bull Plugs . External Upset Swages and Sub-Tubing Nipples . Refinery Swaged Nipples and Bull Plugs
Seamless Casing Nipples . Seamless Tubing Nipples . Steel Tubing Couplings . Substitute Couplings
Sub-Tubing Nipples and Pup Joints . Perforated Tubing Nipples . Adaptor Nipples . Boiler Nipples . Choke Nipples

mer vice president and branch manager of the Tulsa field office.

Prior to his appointment, Dixon was manager of the compressor section, sales department, at Cooper-Bessemer's plant in Mount Vernon, Ohio.

Halliburton Commissions Third Cementing Ship

The Halliburton 208 operating out of New Orleans. This is the third ocean-going cementing ship working on offshore drilling operations.

Halliburton Oil Well Cementing Co.'s third ocean-going cementing ship, the Halliburton 208, was commissioned recently at New Orleans. Joining her sister ships, the 206 and 207, the new vessel completes a trio of cementing ships originated by Halliburton.

All three ships were built by Equitable Equipment Co., Inc. With the christening of the 208, Halliburton rounds out a variety of service facilities for wells drilled in marshy, swamplike areas where roads cannot be built, in shallow and protected waters, and in the open Gulf of Mexico.

The 208 is 124 ft. long, 31 ft. 6 in. in beam, and has a loaded draft of 7 ft. 8 in. The twin-screw cementing boat is equipped with Caterpillar 270-hp.-diesel marine engines with Snow Nabstedt 3 to 1 reverse-reduction gears. It has a maximum speed of 10 knots, and is wheeled with Columbian-bronze, 52-in.-diameter, 41-in. pitch propellers.

The engine room of 208 contains two Caterpillar D318 diesel electric sets which have a capacity of 45 kw. each. Three Howco T-10 pumps, each operated by a Cummins diesel engine, give the 208 its cementing power. Each pump develops from 10,000 to 12,000 psi.

Short-wave radio facilities for communications with shore and other Halliburton vessels is an important part of the new ship's equipment.

In the gulf areas, Halliburton is using 15 major vessels, and several smaller boats, which are used for crew changes and supplies. Three of the 15 are the new 206, 207, and 208. Five are LCT's converted to the company's marine-cementing purposes. Four are bulk barges, nonself-propelled. Two are cementing barges which perform all cementing services but must be moved by tugs. And one is a barge equipped to perform electrical well services.

Cathodic Protection Engineers Attend Meeting

Nine engineers of Cathodic Protection Service, Houston, attended the meeting of the National Association of Corrosion Engineers which was held in Chicago March 7 to 11. Appearing from left to right are: Walter Mach, Houston office; J. R. James, Tulsa office; J. T. Condry, New Orleans office; A. E. Richey, E. P. Doremus, G. L. Doremus, J. G. Davis, Floyd Thorn, Houston office; and Franklin Clark, Denver office.

Tucker Is Named General Manager, George Failing

J. T. TUCKER

The appointment of J. T. Tucker as general manager of sales for George E. Failing Co., Enid, Okla., has been announced by Paul Courtney president of Failing.

For the past 17 months Tucker served as vice president, sales, for Unit Rig Co. Prior to that he was with Emsco Manufacturing Co. He was sales manager for Emsco at the time he left after 13 years of service.

Koppers Appoints Manager of Coupling Department

T. W. CHASE

Theodore W. Chase has been appointed manager of the coupling department, Metals Products Division, Koppers Co., Inc. J. L. Tunstead, sales manager of the division, announced the appointment. Chase will be responsible for design, engineering, and sales of the division's line of industrial couplings.

After graduation in 1937, Chase joined General Electric Co. His service there was interrupted in 1940 when he joined the Army. After leaving the Army in 1946, he returned to General Electric as sales engineer.

Prior to joining Koppers, Chase had been purchasing agent for Pennsylvania Water & Power Co. since 1952.

American Iron Holds Sales Meeting in Oklahoma City

American Iron & Machine Works, Inc., a subsidiary of American Machine & Foundry Co., New York, held its annual sales meeting March 11-12 in Oklahoma City.

Attending the 2-day session were Morehead Patterson, president and chairman of the board, and Robert Kerr, vice president, both of the American Machine & Foundry.

C. L. Griffin, sales manager, and W. R. Wheeler, Jr., assistant sales manager, presided at the meetings. They reviewed 1954 sales and presented plans for the 1955 sales campaigns. Several new products to be marketed this year were shown to the group by the engineering department.

P.G.A.C. Occupies New Plant in Houston

April 23, 1955, represented a milestone in the history of Perforating Guns Atlas Corp., as that company formally opened its new 10-acre plant at Houston. The new plant now comprises four buildings, providing over 26,000 sq. ft. of floor space. The office building is a two-story structure which will be extended later as needed. It is directly connected to the research laboratories building. Another building

P. CHARRIN

J. G. CASTEL

houses the shops and the fourth building contains the garage and shops.

The old plant, with 12,000 sq. ft. of floor area on a one-acre site will continue to be used by the electrical logging department and as a general warehouse.

Perforating Guns Atlas is affiliated with National Cylinder Gas Co.; and P.G.A.C. in turn, has three affiliated foreign operating companies, which are: Perforating Guns of Canada, Ltd., in Canada; Deutsch - Amerikanische Oelfelddienst, G.m.b.H., in Germany;

W. L. YOUNG

C. C. HINSON

and Servicios Tecnicos Atlas, C.A., in Venezuela.

Officers of P.G.A.C. are: Paul Charrin, president; J. G. Castel, executive vice president and assistant sectary; J. W. Dunham, vice president; W. W. Whitness, secretary; and L. Parker McKinley, treasurer.

The following executives have also played a prominent part in the growth of P.G.A.C.: W. L. Young, sales manager; Cecil C. Hinson, assistant to the president; James H. Russell, manager of operations; T. H. Winkler, purchasing agent; Jake H. LeBus, manager of engineering; H. Clay Waters, manager of electrical logging; and W. R. (Dick) Rabson, manager of radiation-logging laboratories.

On October 1, 1946, Charrin started Atlas Research Corp., which was destined to later become the present P.G.A.C. The original company had the modest floor area for shop and office of only 500 sq. ft., and one employe — Charrin. A few weeks later, Castel joined the firm as vice president, the company's second employe.

Today, just 8½ years later, the company has over 430 employes working

T. H. WINKLER

J. H. LeBUS

in four countries. It operates 35 stations, from which a fleet that now is fast approaching 100 logging and perforating field units, serves the oil industry.

Charrin and Castel, both were born in France, arrived in the United States in 1926 and 1938 respectively. Each immediately located in Texas.

P.G.A.C. has pioneered for 8 years in research. Its research has resulted in many well-logging and perforating developments which the oil industry has embraced. Here is but a part of the record of accomplishments: In 1947, Atlas bullet perforating gun; in 1948, Jet Shot perforating techniques and performing of the first field tests; in 1949, gamma ray instruments with quantitative calibration for more radioactive logging of formations; in 1950, simultaneous radiation logging, utilizing the pure neutron/neutron method; and in

H. C. WATERS

W. R. RABSON

1951, a four-resistivity-curve electrical log; Jumbo side wall core sampling in 1952; and quantitive evaluation of porosity in 1953. In 1954 it developed Mighty Mouse, an expendable 1¾-in. jet perforator of greater power for permanent-type well completions and an absolute calibration standard for radioactive sources. In 1955, P.G.A.C. introduced a simultaneous four-resistivity-curve electrical log.

In 1947 the original Atlas Research Corp. changed its name to Atlas Well Service Corp. The following year the company acquired Perforating Guns Co., and in 1949 the two companies were merged under the present name, Perforating Guns Atlas Corp.

Prior to founding this enterprise, Charrin had resigned as executive vice president of Schlumberger Well Serveying Corp., with which firm he had been associated for 20 years. During these 20 years, Charrin served in Central Africa, Belgian Congo, South Africa, Spain, France, Russia, Romania, Germany, Poland, Venezuela, Colombia, and Trinidad.

Castel, prior to joining Charrin in 1946, was also with Schlumberger Well Surveying Corp. His resignation as vice president in charge of the perforating department, terminated 20 years with that firm. He, too, prior to leaving Schlumberger, serviced in France, French Morocco, Spanish Morocco, Algeria, Congo, South Africa, Spain, Russia, and Romania.

General office buildings at the new Perforating Guns Atlas Corp.'s main plant at Houston.

Ladish Makes F. K. Krell Assistant Sales Manager

Ladish Co., of Cudahy, Wis., manufacturer of forged and seamless welding fittings, has announced the appointment of Fred K. Krell as assistant sales manager, fittings division. Krell has had many years' experience in the manufacture and distribution of pipe fittings.

"We drilled more than fifty miles of hole... with no failures with **REED** *Super Shrink-Grip* **TOOL JOINTS"**

THE NOAH PETROLEUM COMPANY
CITIZENS NATIONAL BANK BUILDING
ALBION, ILLINOIS

January 31, 1955

Mr. W. L. Childs, Jr.
General Sales Manager
Reed Roller Bit Company
Houston 1, Texas

Dear Mr. Childs:

I thought you might be interested in the exceptional performance records of your Reed Super Shrink-Grip Tool Joints.

We drilled more than fifty miles of hole...with no failures...with Reed Super Shrink-Grip Tool Joints.

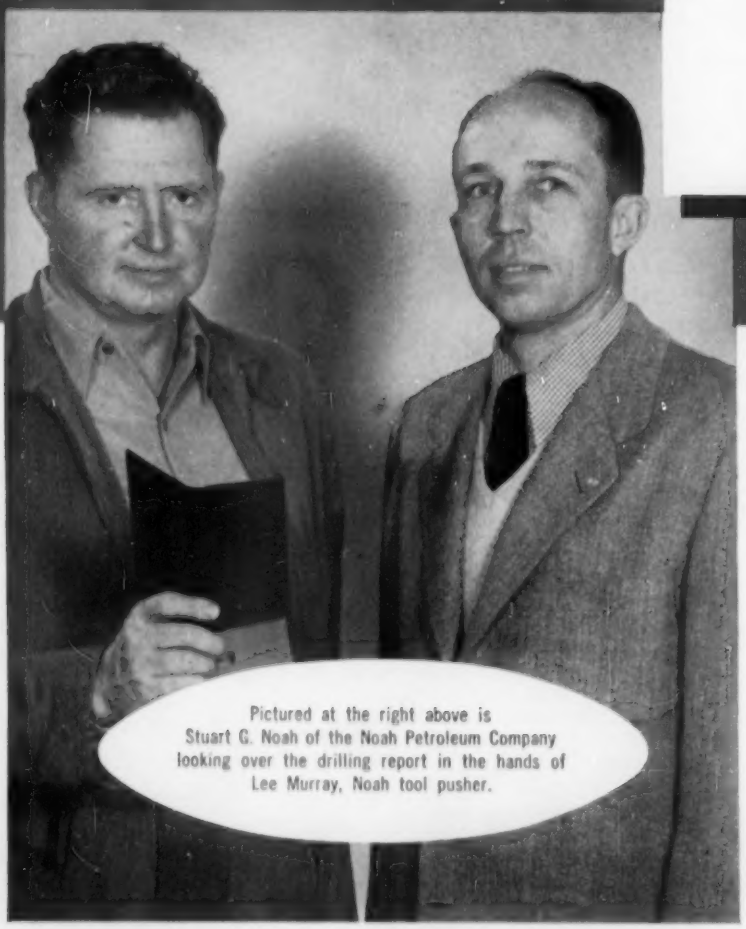
We drilled 102 holes for a total of 266,420 feet with two strings of 4 1/2" 16.60 lb. drill pipe each with two sections of Reed 5 3/4" X 6" O.D. API Full Hole Super Shrink-Grip Tool Joints.

We had no fishing jobs or other tool joint trouble of any kind. All of this drilling has been in the Illinois Basin where the formations are very abrasive and the average life of 4 1/2" drill pipe is about 100,000 feet, with the life of the tool joints averaging 50,000 feet.

The above information on Reed Tool Joints is typical. That's why we have been a long-time 100% Reed Tool Joint user.

Stuart G. Noah

SGN:a



Pictured at the right above is Stuart G. Noah of the Noah Petroleum Company looking over the drilling report in the hands of Lee Murray, Noah tool pusher.

LEADING OPERATORS THROUGHOUT THE OIL WORLD REGULARLY TELL US THAT REED TOOL JOINTS LAST LONGER

and are the SAFEST MONEY CAN BUY

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Gulf Coast, Mid-Continent, Rocky Mountain and Canadian Distributor for Martin-Decker Products

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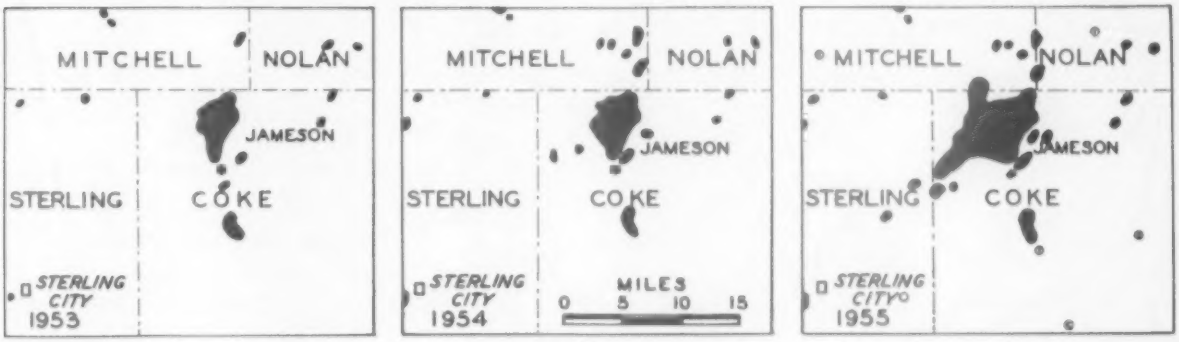
EXPLORATION



On the flank... ...down the dip... ...and how much farther?

Strat Trap Outproduces Deeper Reef

by Frank J. Gardner

A RATHER spectacular example of oil-field expansion was spotlighted on April 1. On that date, the Railroad Commission of Texas combined as one field a group of Strawn-Pennsylvanian pools that had been quietly developed in Coke County, Texas.

Strat traps . . . Over the past year and a half, the steady westward expansion of Jameson-Strawn field has engulfed most of the northwest corner of Coke County (see maps above.) The consolidation of Jameson with Fuller-Coke, Southeast Fuller - Coke, South Fuller - Coke, and North Fuller - Coke fields brings home the enormous possibilities of this type of stratigraphic accumulation for other reef areas in West Texas

Jameson, originally discovered in December 1946, was first considered strictly a reef field. The structure had been found and described by surface geologists way back in 1923, but nobody got around to finding the field until December 1946, after refraction seismic surveys confirmed the early surface work. Then Sun Oil Co. drilled its discovery well, the 1 Jameson, and began to develop the Strawn reef, lying at depths of 5,700 to 7,480 ft. Nobody suspected the shallower possibilities in the Strawn sands that swept off the reef's western flank. But subsurface studies convinced Chester Hunter, a Dallas independent operator, that a stratigraphic pinchout might overlie the reef in that vicinity. In January 1952, he sank the first Strawn sand well at his 1 Stagner, a 141-bbl. producer lying west of the reef wells. Oil flowed from a sand at 5,862 ft., about 500 ft. above the Strawn reef top.

Development of the field was slow at first. Operators pushed down only 40 wells in 1952, but added 104 producers in 1953. In 1954, a rapid development program more than doubled the size of the field and with 50 tests active, the area is expanding even more rapidly today.

Hold potent promise . . . Some idea of the latent possibilities of this field is revealed by these April 1955 figures:

Number wells producing: 391 (388 flowing, 3 pumping).

Daily field allowable (bbl.): 36,136 (MER 111 bbl. per well).

Daily potential capacity (bbl.): 86,697 (average 221 bbl. per well).

Productive acreage: 15,640.

Cumulative production (bbl.): 4,962,109 (to January 1, 1955).

The Strawn sands are produced in the field as a single zone, although some operators feel that they are really a series of communicated, separate sands. They do not occur on the crest of the reef structure, but pinch out over its west flank. The sands are 200 to 300 ft. thick, with an average porosity of 10 per cent and permeability range of 0.02 to 1,800 md. Fracturing is a standard procedure in most completions.

How much larger the field may become is still speculative; already, it has spilled over into Mitchell County on the north and into Sterling County on the west. Two recent discoveries in eastern Sterling County (see 1955 map above) are expected to add hundreds of acres to the productive area, and further expansion to the northwest can certainly be expected.

With the completion of W. M. & A. P. Fuller 1 Davis on February 9, the Strawn sand trend was extended southwest about 3 miles into eastern Sterling County. This discovery, completed for 353 bbl. per day on ¼-in. choke, flowed Strawn oil from a depth of 6,900 ft. It opened the eyes of West Texas operators to the possibility of a definite southwest extension to Jameson. On February 26, a second discovery, J. B. Randle 1 Munn, carried the sand trend some 4 miles farther to the southwest. It produced 228 bbl. daily from Strawn sand at 7,355 ft., and set off a lease play all over eastern Sterling County.

On other reefs . . . Here is a glowing example of the stratigraphic trap offering far greater promise than the structural trap, especially to the independent operator, provided he's sharp enough to spot such traps. The Jameson-Strawn sands now are producing three times as much oil from three times as many wells as the reef field has yielded. Careful subsurface study might well reveal similar conditions on numbers of other West Texas Pennsylvanian reefs, especially in the row of counties along the Eastern Platform of the Permian basin.

March... Month of Movement

Hugoton—Outstanding Wildcat Province

1. First "outside Hugoton" Permian production.
2. Panhandle watches the Ellenburger.
3. Beaver County . . . First wildcat prize went to this Oklahoma county.
4. Kiowa County . . . Led Kansas activity.

Marietta Basin Awakens

5. Viola reservoir spreads out in Carter County area.
6. New light shed on South Oklahoma's complex producing trend.

Canada's Western Foothills

7. Big development program set for Westward Ho region.
8. Giroux Lake . . . Another granite wash discovery for Alberta.
9. Chinook Ridge . . . Canada's "wildest wildcat."

From Port Arthur To Florida Bay

10. Texas opened fifth offshore field.
11. Major gas-condensate field looms in Lafourche Parish, Louisiana.
12. Florida's first offshore test rigging up.

Unending Ellenburger Success

13. Ellenburger pay added to Devonian area of Ward County, Texas.

Rocky Mountain—Confirmations And Rank Wildcatting Due

14. Second Nevada well completed.
15. South Dakota prospect abandoned after finding oil shows.
16. Rank exploration set for Northern Powder River basin.

From West Virginia to Santa Cruz Island

17. Deepest Appalachian hole quit at 13,331 ft.
18. Five wells at Eldorado, Ill., came in for 1,000-1,200 bbl. daily.
19. 15,000-ft. wildcat scheduled for Sacramento Valley.
20. Sunset Beach may close Huntington-Seal Beach gap.

March "Busted Out All Over"

by John C. McCaslin

THE year 1955 will go down in the industry's books as a period of widespread exploration. The first month of spring witnessed a surge of wildcatting from the far northwest reaches of Alberta to the offshore waters of southern Florida, and from the Appalachian Mountains to rocky Santa Cruz Island in the Pacific.

The drill bites deep . . . Deep exploration in March came up with impressive results in West Texas, southern Oklahoma, Alberta, and in the Hugoton embayment of the western Anadarko basin.

The Ellenburger bonanza paid off once again in West Texas. This time it was in Ward County. Cities Service Oil Co. 1 Brandenburg "B" was completed dually from the Devonian and Ellenburger, a new-pay strike for the Payton-Devonian area. The discovery had an absolute open-flow potential of 62,000 M.c.f. of gas per day plus 45 bbl. of distillate per million cubic feet of gas from the Ellenburger.

Texas Panhandle eyes are peeled on the new Ellenburger discovery area in Gray County's deep Anadarko basin region. Several wells in the area are going down to evaluate the year's biggest discovery for Texas. Outcome of Panhandle Ellenburger-bound wildcats is of the ultmost interest to exploration men.

Mid-Continent area geologists for many years have thought that the very complex producing trends of southern Oklahoma are brothers to Grayson County trends to the south in Texas. Well control has been scattered in the barren area between the trends. In March this 30-mile gap was whittled down to 15 miles at Frankfort Oil Co. 1 Conrad, deep North Marietta pool test in Love County, Oklahoma. The well went through the Viola-Ordovician lime three times, finding good production in this intensely faulted and folded locale.

An extensive Viola search is getting excellent results in the Lone Grove area of southern Oklahoma. A thick Viola pay zone was encountered by Frankfort Oil Co. in Carter County, setting off one of the hottest lease plays in several years. Seven wells have been completed in the zone, one of them logging a 900-ft. pay section. Potentials have ranged in the 50-bbl. per hour class.

Total March Completions, Exploration and Development

	Total completions					Total wildcat wells					Active
	Total	Oil	Gas	Dry	Footage	Total	Oil	Gas	Dry	Footage	operations
Alabama	5	0	0	5	14,537	5	0	0	5	14,537	6
Arkansas	54	23	0	31	203,080	13	2	0	11	47,934	68
California	234	179	2	53	1,095,176	42	6	2	34	233,604	216
Colorado	105	28	3	74	592,103	58	2	3	53	331,729	107
Florida	2	0	0	2	10,167	2	0	0	2	10,167	3
Illinois	213	124	0	89	502,410	30	2	0	28	58,921	387
Indiana	70	14	2	54	106,029	44	1	0	43	65,602	58
Kansas	481	256	37	188	1,656,934	75	10	3	62	310,014	469
Kentucky	87	34	22	31	164,731	14	2	0	12	25,173	149
Louisiana	298	193	21	84	2,036,434	50	19	3	28	509,759	354
North	140	100	9	31	393,971	12	2	0	10	67,920	155
South	158	93	12	53	1,642,463	38	17	3	18	441,839	199
Michigan	37	21	0	16	113,564	12	2	0	10	39,563	107
Mississippi	45	16	0	29	332,620	20	1	0	19	135,649	50
Montana	26	11	2	13	130,564	9	0	1	8	37,277	41
Nebraska	49	20	0	29	288,370	20	2	0	18	114,499	53
New Mexico	135	87	31	17	586,210	15	7	0	8	58,599	178
Northwest	33	0	29	4	130,087	2	0	0	2	12,904	37
Southeast	102	87	2	13	456,123	13	7	0	6	45,695	141
New York	12	6	0	6	17,400	0	0	0	0	0	8
North Dakota	18	13	0	5	128,615	3	0	0	3	13,237	23
Ohio	101	48	19	34	220,934	3	1	0	2	11,119	186
Oklahoma	781	498	31	252	2,448,467	78	20	7	51	344,923	1,129
Pennsylvania	65	24	15	26	138,431	0	0	0	0	0	62
South Dakota	0	0	0	0	0	0	0	0	0	0	0
Texas	1,776	1,110	47	619	7,448,821	453	67	13	373	2,185,536	1,304
North Central (7-B & 9)	724	432	7	285	2,146,123	192	32	1	159	669,350	324
West (7-C & 8)	423	330	6	87	2,287,866	68	11	3	54	370,607	458
Panhandle (10)	82	69	7	6	282,456	6	2	2	2	47,465	49
East (5 & 6)	84	25	7	52	427,106	36	2	1	33	194,734	85
Gulf Coast (2 & 3)	201	105	10	86	1,311,158	67	11	4	54	530,631	142
Southwest (1 & 4)	262	149	10	103	994,112	84	9	4	71	372,749	246
Utah	3	1	2	0	16,943	2	1	1	0	10,564	22
West Virginia	42	8	26	8	113,929	3	0	0	3	21,420	143
Wyoming	48	24	4	20	250,021	13	1	1	11	72,174	97
Miscellaneous	¶1	0	0	1	6,612	1	0	0	1	6,612	§2
Total March 1955	4,688	†2,738	264	*1,686	18,623,102	965	‡146	34	785	4,658,612	5,222
Total February 1955	4,071	2,340	227	1,504	16,691,410	864	138	18	708	4,211,506	5,229
Cumulative 1955	13,103	7,564	752	4,787	52,892,229	2,756	416	85	2,255	13,330,632	
Cumulative 1954	12,957	7,329	916	4,712	53,966,733	2,565	382	76	2,107	12,722,393	
Western Canada	222	152	13	57	1,006,794	71	13	5	53	396,312	
Alberta	121	83	10	28	672,131	41	11	4	26	275,805	
Saskatchewan	67	47	0	20	227,805	19	1	0	18	69,788	
Manitoba	24	22	0	2	53,433	3	1	0	2	8,774	
B.C.-N.W.T.	10	0	3	7	53,425	8	0	1	7	41,945	
Cumulative 1955	627	445	33	149	2,791,640	177	40	17	120	912,465	

*Incl. 77 service wells: Kans. 2, Mich. 1, N. Y. 6, Ohio 4, Okla. 40, Pa. 24. †Incl. 64 condensate wells: Kans. 1, S. La. 22, Okla. 17, E. Tex. 1, Gulf Coast 15, S.W. Tex. 8. ‡Incl. 20 cond. strikes: Kans. 1, S. La. 10, Okla. 4, Gulf Coast 4, S.W. Tex. 1. §Incl. Nev. 2, ¶Nev.

Things look good for southern Oklahoma this year.

Up in Canada's "Texas" a heavy development program is under way in Alberta's Westward Ho-Sundre Mississippian discovery area. There are five wells in the fire for this prolific region 60 miles north of Calgary. The Westward Ho discovery, no doubt the most significant since Turner Valley, was completed near the first of March for 1,002 bbl. of oil per day on ¼-in. choke. The Sundre discovery netted 2,808 bbl. per day earlier this year. It is thought that the two discoveries lie on a common 7-mile-long uplift.

The granite wash, rising fast in Canada as a prolific pay, first entered the 1955 exploration scene at Clear Hills in far northwestern Alberta. The prolific pay lies below the Upper Devonian at 6,900 ft. at Clear Hills. In March the granite wash pay climbed further up the success ladder at Giroux Lake in a practically untested area. This success found oil at 10,000 ft. The latest Cardium surprise for Alberta came in March at Chinook Ridge way out on the western edge of the province. It takes more than two eyes to watch the new Cardium pools popping up in widely scattered Alberta areas.

Probably the busiest region in the United States in March was the Hugoton embayment of the Anadarko basin. Beaver County in the Oklahoma Panhandle is Oklahoma's No. 2 county in exploratory and development work. The fast-forming Mississippian-Pennsylvanian trend in this county looms as a major gas-condensate producing area for the Mid-Continent. The Mississippian is cause for a recheck of the potentialities of Kansas' Kiowa County with three new pools of great promise opened. Permian gas production was moved 30 miles east of established fields in the Oklahoma Panhandle, a surprise to most wildcat men.

In far-flung land . . . Important extensions and discovery of more oil and gas-condensate sands at the new La Rose field in Lafourche Parish indicate another major producing area for coastal Louisiana.

Completion in March by Humble Oil & Refining Co. of its second well in the new extension area 1 mile north of the field's discovery well, gave the area its sixth pay zone, ranging from 10,936 to 12,234 ft. in depth.

The sole producing area in the vast Great Basin and Range province, Nevada's Eagle Springs Unit, appeared to be due confirmation at month's end. Shell Oil Co. swabbed 580 bbl. of oil per day at its Nye County confirmation well, 1,700 ft. south of the Eagle Springs discovery. South Dakota had its second producing area in prospect during March at Shell-Carter 1 Hansen

Total Depth Classifications, March 1955

	A 0-1,250 ft.	B 1,250-2,500 ft.	C 2,500-3,750 ft.	D 3,750-5,000 ft.	E 5,000-7,500 ft.	F 7,500-10,000 ft.	G 10,000-12,500 ft.	H 12,500-15,000 ft.	I Over 15,000 ft.
Alabama	2	1	1	0	1	0	0	0	0
Arkansas	0	9	29	5	11	0	0	0	0
California	24	23	34	79	33	27	11	2	1
Colorado	0	0	1	14	87	3	0	0	0
Florida	0	0	0	1	1	0	0	0	0
Illinois	17	88	106	1	1	0	0	0	0
Indiana	32	30	8	0	0	0	0	0	0
Kansas	11	58	236	158	18	0	0	0	0
Kentucky	30	32	22	3	0	0	0	0	0
Louisiana	4	104	12	4	28	55	54	30	7
North	4	102	8	3	13	9	1	0	0
South	0	2	4	1	15	46	53	30	7
Michigan	1	12	9	13	2	0	0	0	0
Mississippi	2	0	1	6	23	4	9	0	0
Montana	0	2	11	4	2	7	0	0	0
Nebraska	0	0	0	6	43	0	0	0	0
New Mexico	3	14	55	25	26	4	6	2	0
Northwest	0	10	6	2	14	0	1	0	0
Southeast	3	4	49	23	12	4	5	2	0
New York	0	12	0	0	0	0	0	0	0
North Dakota	0	0	4	0	1	13	0	0	0
Ohio	27	24	45	5	0	0	0	0	0
Oklahoma	97	252	190	127	67	38	10	0	0
Pennsylvania	1	50	8	0	6	0	0	0	0
South Dakota	0	0	0	0	0	0	0	0	0
Texas	175	406	339	283	352	156	37	25	3
North Central	121	251	114	125	103	6	4	0	0
West	11	49	90	71	110	55	15	21	1
Panhandle	1	6	67	4	1	0	2	1	0
East	10	6	6	21	27	13	1	0	0
Gulf Coast	3	12	13	26	72	58	12	3	2
Southwest	29	82	49	36	39	24	3	0	0
Utah	0	1	0	0	1	1	0	0	0
West Virginia	5	19	11	6	0	0	0	1	0
Wyoming	4	2	7	11	16	5	3	0	0
Miscellaneous	0	0	0	0	1	0	0	0	0
Total March 1955	435	1,139	1,129	751	720	313	130	60	11
Total February 1955	318	980	1,009	613	652	303	133	59	4
Cumulative 1955	1,110	3,111	3,310	1,999	2,052	943	393	164	21
Western Canada	1	36	47	43	80	9	5	1	0
Alberta	1	2	14	21	68	9	5	1	0
Saskatchewan	0	14	28	21	4	0	0	0	0
Manitoba	0	19	5	0	0	0	0	0	0
B.C.-N.W.T.	0	1	0	1	8	0	0	0	0
Cumulative 1955	6	104	136	121	217	33	9	1	0

and Clarkson, 8 miles southwest of Buffalo field, but the wildcat was abandoned early in April.

The new Sunset Beach field in California, which may develop to fill the gap between Huntington Beach and Seal Beach production, was in line for close well spacing. Eight wells are under way with others planned.

And offshore areas . . . Magnolia Petroleum Co. opened Texas' fifth offshore field. The latest strike, a gas producer, is 8 miles off the coast of Jefferson County and 12 miles southwest of Sabine Pass.

Plans for drilling Florida's first offshore test were made public. Location, made by Gulf Oil Corp., is in the Florida Bay area between the mainland and the Florida Keys. The test will go to the Sunniland lime of Lower Cretaceous-Glen Rose area, expected at about 12,500 ft.

EXPLORATION HIGHLIGHTS

MID-CONTINENT

KANSAS

Barber County Has Good Oil Strike in Sight

A new oil pool looms for Barber County at Globe Oil & Refining Co.-B. M. Heath 1 Goemann, NW NE NW 29-32s-10w.

Recovery was 498 ft. of muddy gas oil on a drill-stem test at 4,427-50 ft. in the Mississippi chat. This wildcat is located 4 miles southwest of Sharon field in eastern Barber County.

Lansing Discovery Hinted In Decatur County Area

Pipe is set for testing at Sauvage Drilling Co. 1 Stoney, SW SW SW 27-2s-28w, Decatur County wildcat.

Recovery on a drill-stem test at 3,620-62 ft. in the Lansing lime was 112 ft. of gassy oil and 120 ft. of oil-cut mud. This wildcat is located in north-central Decatur.

Nomenclature Committee Labels New Kansas Fields

The Kansas Nomenclature Committee named eight new fields at its April meeting in Wichita.

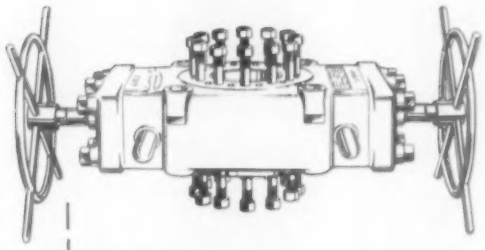
Southern Kansas . . . Norris pool was opened in Sumner County at Natural Gas & Oil Corp. 1 Norris, SE SE NW 3-34s-2e. Production is from the Layton sand.

Another Graham County pool was

Perfect for Work-over Rigs . . .

Guiberson BLOWOUT PREVENTER

with Chain Drive



TYPE A
BLOWOUT PREVENTER
MANUAL DRIVE

- This work-over special is also ideal for small hole drilling.
- Chain drive provides tight seal with one man operation.
- Two types — A for working pressures to 3000 psi (6000 psi test) — 7⅜" opening. Manual or chain drive.

  B for working pressures to 2000 psi (4000 psi test) — 9-1/16" opening. Chain drive only.
- Short and compact design — body is only 11½" high.
- Keeps well head equipment close to ground.
- Designed to use two preventers in combination without need of flanged adapters.
- Connecting tie bolts and nuts furnished at no extra cost on original sale of dual preventers.
- Universal slide designed to handle blank rubbers or 2", 2½", 3", 3½", 4" tubing sizes or 5½", 7" casing sizes.

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opened at Brush Creek by Imperial Drilling Co. at 1 Brown "C," SE SE NW 4-9s-23w. The well completed for 1,155 bbl. of oil per day from the Lansing lime.

Northwest Kansas . . . Sheridan County has two new Lansing oil pools, Custer and Southeast Studley. Custer pool was opened at Jones, Shelburne & Farmer 1 Custer, NW NW SE 12-10s-26w. The 1 Pratt is the discovery well for Southeast Studley, SE SE NE 26-8s-26w.

Western Kansas . . . Soldier Creek field was opened by GMR Oil Co. at 1 Piester, SW SW NW 24-29s-16w, Kiowa County, with production from the Mississippian.

Central Kansas uplift . . . In Graham County, Red Lime pool was opened at Century Refining Co. and K&E Drilling Co. 1 Ferrell, SE SE NW 32-9s-22w. Production is from Lansing.

Sedgwick basin . . . In Kingman County El Dorado Refining Co. 1 McCalla, NE SE NW 11-30s-9w, was finaled flowing 2,130 M.c.f. of gas per day plus 20 bbl. of oil from the Mississippian to open South Zenda field.

Also in Kingman County North Dewey field opened at Century-Laura Jane 1 Ramsdale, NE NE SE 5-28s-5w.

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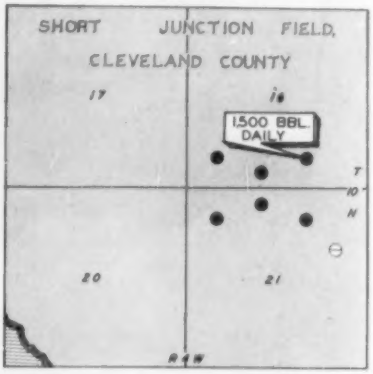
OKLAHOMA

Big Hunton Well Finaled In Short Junction Area

Continental Oil Co. is finishing up at its 1 Maruska-A, SW NE 16-10n-4w, in the Short Junction district.

The well flowed an estimated 1,463 bbl. of oil daily on ½-in. choke, based on an 8-hour test of perforations at 8,152-8,226 ft. in the Hunton lime.



Development work continues with good success in Short Junction field. Continental 1 Maruska-A was completed for an indicated daily flow of more than 1,450 bbl. following acid from the Hunton lime. The well is in SW SE 16-10n-4w. Other wells are the 3 Rowland, NE NE 21-10n-4w, and the 1 Bowman, NE SE 22-10n-4w.

Carter County . . . In the Overbrook area Stanolind Oil & Gas Co. 2 Simons, NW SE SW 23-5s-1e, flowed new oil at the rate of 189 bbl. in 6 hours after fracturing in the Bromide sand at 1,739-44 ft. Daily potential is 694 bbl. of 40°-gravity oil. Flow was on ¾-in. choke.

Shallow Overbrook Drilling Showing Good Success

Shallow completions are enhancing the possibilities in the Overbrook area of Carter County, southern Oklahoma.

Stanolind Oil & Gas Co. 2 Simons, NW SE SW 23-5s-1e, flowed 694 bbl. per day from perforations at 1,739-44 ft. Seaboard Oil Co. is underway at 1 Cardwell, NE NW NE 22-5s-1e. State Oil Co. has begun operations at 4 Hillingsworth, SE NE NW 26-5s-1e. A good recovery was reported on test at 1,325-1,420 ft. at Stanolind 3 Simons, SE SE SW 23-5s-1e.

Initial Flow Test Reported At North Madill Field Well

Initial flow test is reported at Sinclair Oil & Gas Co. 1 Nunley, SE NW NW 15-5s-5e, North Madill area.

The well perforated in the McLish

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This Accoloy X-Weld 125 link was ground and etched to show its big welded area—2½ times the size of welded area possible with other welding processes. This means more than double the security at the weld—and only X-Weld has it!

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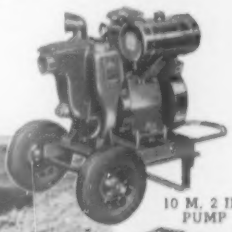
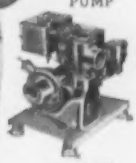


10 M. 2 IN. PUMP



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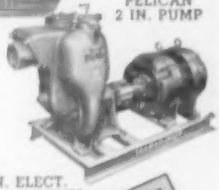

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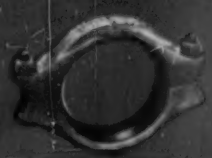

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and third Bromide sands at 6,246-50, 6,262-70 and 6,742-52 ft. Recovery was 232 bbl. and 338 bbl. respectively, load and new oil, in 22 hours. Flow was through ¾-in. choke.

Surveying is active in this area of Marshall County. Atlantic Refining Co. has a unit in 4s-5e, Johnston County, moved down from 5s-5e, Marshall County. Gulf Oil Corp. has moved a unit from Stephens County into the North Madill area. Superior Oil Co. is prospecting with a seismic unit in 5s-5e and 5s-6e.

NORTH TEXAS

Gasser Recompleted as Ellenburger Discovery

Further testing and recompletion has changed the status of Sorrells Oil Co. 1 Scarborough from a gas discovery to an oil discovery.

New perforations in the Ellenburger were from 4,187-92 ft., and new potential was 284.3 bbl. of 40° oil a day through 28/64-in. choke. Gas-oil ratio was 4,400:1.

Previous potential was 9,800,000 cu. ft. of gas a day through open tubing. Location is 4½ miles south of Oplin, in 146-2-GH&H Survey.

Humble Oil & Refining Co. 1 Betcher, wildcat 7 miles northwest of Oplin, has been completed as a Flippen discovery.

On potential test the well made 46.83 bbl. of 41° oil a day from perforations at 1,780-86 ft. Choke size was ¼-in., tubing pressure 150 psi., and gas-oil ratio 110:1.

This well drilled to the Ellenburger dolomite and had total depth at 4,881 ft. before plugging back.

WEST TEXAS-NEW MEXICO

WEST TEXAS

New Pay in Coke County

Humble Oil & Refining Co. 91 Sallie Odom "F," Goen field test in northeastern Coke County, found the regular pay carried salt water but plugged back to open a new pay horizon. Total depth was 5,720 ft.

On test between 5,352-74 ft., through ¼-in. choke, the well flowed 226 bbl. of oil a day with no water. Tubing pressure was 260 psi., gas-oil ratio was 812:1, and gravity was 46°. Location is on the western edge of Goen field, in Seth Clark Survey 475, which is 4 miles south of Blackwell.

Humble 2 Helen Weaver, Strawn wildcat, flowed 119 bbl. of fluid in 22 hours through ⅜-in. choke, from perforations at 6,250-60 ft. Water

source had not been determined at this report, but was about half of the total volume.

Strawn Discovery Offset Flows at High Rate

Rapid development of the new Strawn field in northeastern Sterling County is assured, on the basis of offset tests. Warren Petroleum Corp. 1 Hal Knight, east offset to Fuller & Fuller 1 Davis, discovery well, flowed better than 60 bbl. of oil an hour following fracture treatment of open hole at 6,800-85 ft. In the first 11 hours of testing through 24/64-in. choke, the well produced 610 bbl. of load oil.

Superior Oil Co. 1-116 Knight, south offset to the field discovery, had total depth at 6,945 ft. and was ready for testing. Top of the sand was logged at 6,822 ft.

New Work at South Big Lake

Southern Production Co. has staked location for a second test in the South Big Lake field in Reagan County. Location is a north offset to 1 Young, opener of Fusselman production in the area, and lone producer. Projected depth of the new test is 9,800 ft.

HUGOTON EMBAYMENT

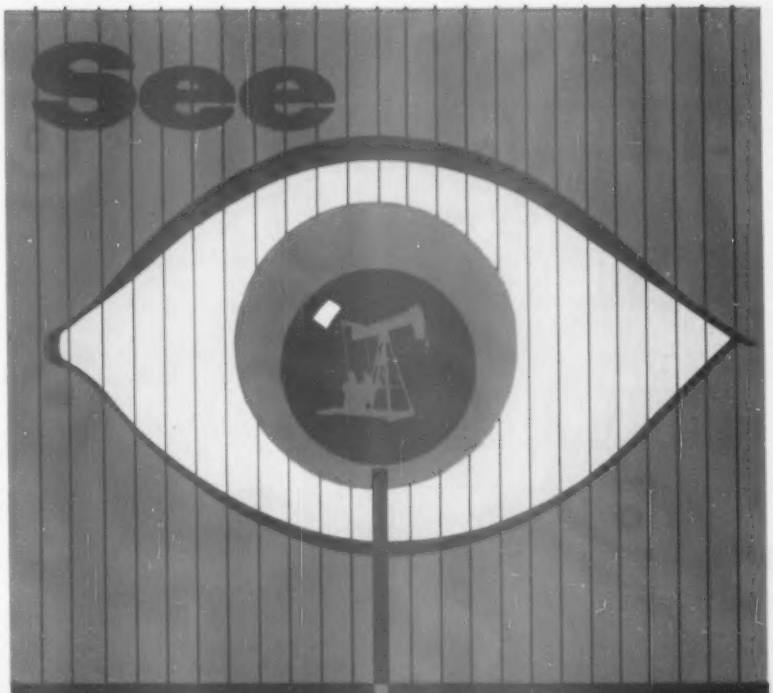
OKLAHOMA PANHANDLE

Lansing Gas Strike Reported in Texas County

Lansing-Pennsylvanian (Missouri) gas was tested at a rank wildcat in western Texas County, 3 miles west of Rice.

The indicated discovery, Phillips Petroleum Co. 1 De Lier, SW NE 32-3n-10eCM, 9 miles southwest of Northwest Eva field, flowed 1,910 M.c.f. per day in 70 minutes and 1,652 M.c.f.

Phillips Petroleum Co. has tested gas in the Lansing lime at a rank Texas County wildcat, the 1 De Lier.



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per day at the end of the test at 3,326-48 ft. The well is 10 miles southeast of Keyes field and 20 miles west of Permian production at Hugoton-Guymon field.

First Fort Scott Producer For Keyes Field Potentialed

Phillips has taken potential at the first Des Moines-Fort Scott lime producer in the region at 1 Cimarron, Keyes field test in SW SW NE 16-4n-8eCM.

The new-pay strike flowed 9,160 M.c.f. of gas per day after acid from perforations in the Fort Scott lime at 4,070-80 ft. Regular field production is the Keyes sand, or basal Morrow.

Permian Discovery in Beaver Is Completed

Final gage is reported on a remote Permian gas discovery in Beaver County, 4 miles northwest of new Northwest Mocane field.

Lion Oil Co. 1 Hodges, SW NE 21-6n-24eCM, made absolute open flow of 4,500 M.c.f. of gas daily from perforations in the Council Grove at 3,102-3,315 ft. earest such production is about 40 miles to the west in Hugoton field.

TEXAS PANHANDLE

Hansford Receives a New Douglas Discovery

A new Douglas (Virgil) lime discovery is complete in north-central Hansford County. The discovery is Skelly Oil Co. 2 S. P. Jackson, 5 miles south of Hitchland.

The well gaged 6,750 M.c.f. of gas daily on final company gage from perforations at 4,601-21 ft. Nearest Douglas oil production is in Hitchland field, 1½ miles southeast.

ARK-LA-TEX

NORTH LOUISIANA

Stanolind Records New Smackover Hit in Claiborne

A new Smackover oil discovery is reported in north-central Louisiana at 1 Bell Unit, C SW NE SE 5-22n-5w,

Arrow points to new Smackover oil discovery in eastern Claiborne Parish.

1¼ miles northeast of Bayou Middle Fork field - Cotton Valley, Claiborne Parish.

Crews are coring below 10,545 ft. with a third drill-stem test in the Smackover behind them. The wildcat is

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3½ miles southeast of Colquitt field, and 4½ miles northwest of Summerfield field. It is also situated 4 miles north of Antioch field-Smackover.

Lamar field in Franklin Parish has been extended southwest at a second well in the area. Production is from Lower Tuscaloosa. The well is Hudson Gas & Oil Corp. 1 O'Brien, NE NE 4-15n-9e. The well flowed 100 bbl. of 43°-gravity oil per day from 5,114-17 ft.

Lisbon Field Gets New Gas Condensate Pay

Hassie Hunt Trust and Associates have given Lisbon field in Claiborne Parish a new Haynesville "A" discovery.

The well flowed 41 bbl. of 59°-gravity condensate and 228 M.c.f. of gas per day on 18/64-in. choke from perforations at 10,147-53 ft., natural, in the "A" zone.

GULF COAST

TEXAS GULF COAST

New Deep Pay Produces In West Rockport Field

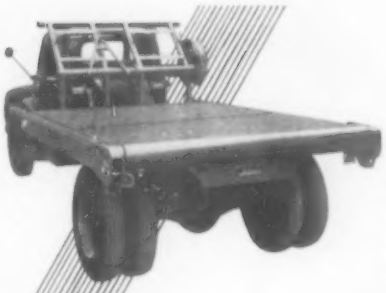
Heep Oil Corp. has opened another deep gas-condensate reservoir on the west side of the multiple-pay West Rockport field, on the Aransas County coast. Discovery well, 2 Sellers, is 3 miles west of Rockport townsite.

New pay, in Frio sand, is perforated at 8,632-40 ft. Open-flow potential of the well is placed at 19,000,000 cu. ft. of gas per day with gas-condensate ratio of 40,000 cu. ft. per barrel. Shut-in pressure gages 2,852 ft. Flow through ⅞-in. choke was at the rate of 2,245,000 cu. ft. per day with tubing pressure of 2,852 psi.

Testing is under way at Heep's 5 Roquette, another West Rockport well perforated in the new 8,600-ft. sand.

Placedo Wildcat Produces

Seaboard Oil Co. has a new discovery well 2 miles southeast of Placedo, in



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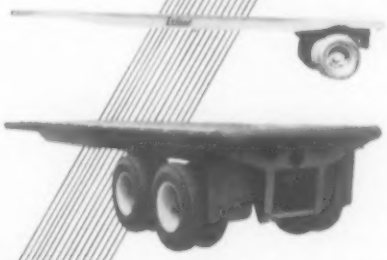

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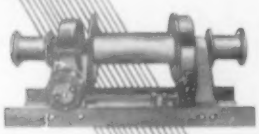

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Victoria County. The well, 1 Pickering, in the J. M. Brownson Survey, produced on open-flow tests at the rate 16,200,000 cu. ft. of gas per day. Gas carried a spray of 63.1° condensate in the ratio of 1 bbl. to 57,400 cu. ft. of gas. Shut-in pressure is 2,131 ft. Pay interval, in Frio sand, is 6,164-69 ft.

Wharton County Wildcat Gets High Gas Potential

Sparta Oil Co.'s newly completed discovery well east of Louise field, in western Wharton County, is rated good for 210,000,000 cu. ft. of gas per day on open flow potential tests.

The well, 1 Hutchins & Pearson,

Arrow points to location of Sparta Oil Co.'s newly completed gas-condensate discovery well in western Wharton County, central coastal area of Texas.

testing through ⅞-in. choke, flowed 2,000,000 cu. ft. of gas per day with liquid recovery of 30 bbl. of condensate. Flowing pressure gaged 2,675 psi. Shut-in pressure is 2,695 psi.

Production is from a lower Frio sand with casing-perforations at 7,123-68 ft. Hole was drilled last July to 7,250 ft., and abandoned. Present operators cleaned out to 7,226 ft. and ran casing, cemented at the latter depth.

The discovery is about 1 mile from Louise production and 1¼ miles northwest of Hilge field. It is about 6 miles south of the town of Hilje.

SOUTH LOUISIANA

Oil Production Opened In Two Offshore Areas

Offshore exploration around the delta region of Plaquemines Parish has resulted in two additional oil-discoveries, one by Continental Oil Co. in Main Pass Area, off the east coast in Breton Sound, and the other by California Co. at the tip of Southwest Pass, in South Pass Area.

Continental's discovery well on its

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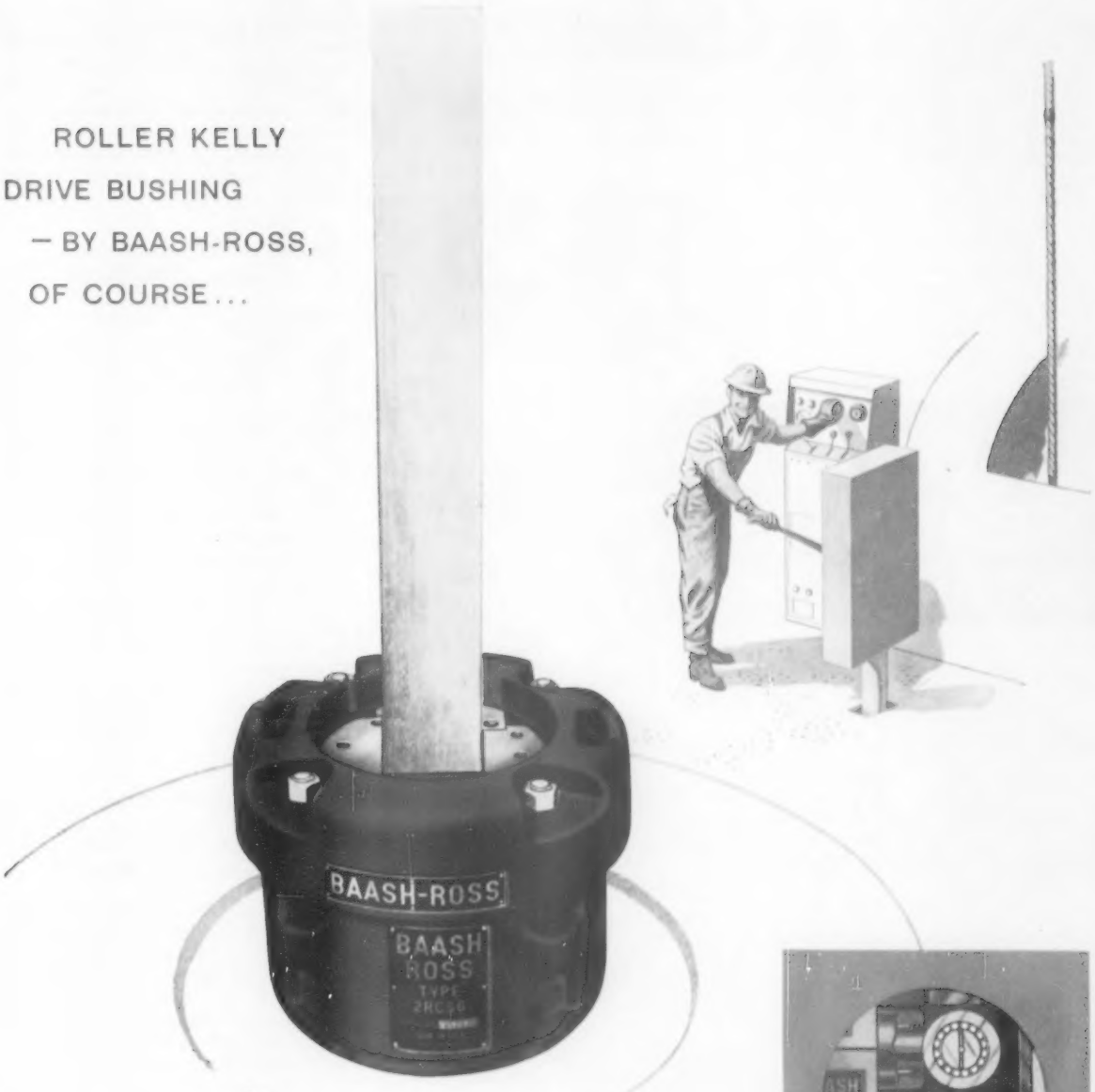

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State Lease 2511, in Block 25, is good for 227 bbl. of 28.6°-gravity oil per day, flowing through 7/32-in. choke with pressure of 700 psi. Gas-oil ratio is 370 cu. ft. per barrel. Pay-interval is at 6,224-30 ft. Drilled depth was 10,002 ft. Nearest other production is in Block 32 field, 3 miles to the south.

California Co.'s discovery well, 1 State Lease 2553, in Block 41, flowed at the rate of 238 bbl. of 34.7°-gravity oil per day through 9/64-in. choke with pressure of 1,945 psi. and gas-oil ratio of 606 cu. ft. per barrel. Pay-interval is 10,096-10,108 ft. in hole drilled to 13,972 ft. Location is 8 miles south of Continental's production in Block 52, West Delta Area.

Fort Jackson Discovery Produces Gas-Condensate

F. A. Callery's new gas-condensate discovery-well at Fort Jackson, 60 miles down the Mississippi River from New Orleans in the Plaquemines Parish delta area, produced at the rate of 94.08 bbl. of fluid with 5,471,000 cu. ft. of gas per day during potential gage through 17/64-in. choke. Flowing pressure ranged from 4,775 to 5,000 psi.

Production is from a 27-ft. casing-perforated interval at 10,794-10,821 ft. Hole had been drilled to 14,129 ft.

Fort Jackson is on the west bank of the river, about 7½ miles northwest of Venice field. It is about 6 miles south of Quarantine Bay field, in Quarantine Bay, across the river, and off the east coast of the parish.

"Relief" Well Completed As St. Martin Discovery

Shell Oil Co. is opening a new gas-condensate area 3 miles southeast of Bayou Long field, in eastern St. Martin Parish. Discovery well is its 1-A Schwing, started as a relief well to its 1 Schwing, a wildcat which blew out early this year while drilling at 12,487 ft. The latter well was killed and hole junked last February.

The new well, directionally drilled to bottom location west of the blow-out well, is perforated at 11,848-63 ft. with casing cemented at 12,158 ft., total depth. Flowing through 9/64-in. choke, it made 27 bbl. of 47.5°-gravity condensate with 1,970,000 cu. ft. of gas per day.

Testing also is under way at a south offset to the blow-out well. This well, 1 Williams, drilled to 13,500 ft., is perforated at 11,884-89 ft.

MISSISSIPPI

Pistol Ridge Area Gets Lower Cretaceous Well

First Lower Cretaceous production for the Maxie-Pistol Ridge area, of Forrest and Pearl River counties, is being opened by Southern Production Co., Crow Drilling Co., and Larco Drilling Co., joint operators, in a deep test on the northwest side of the Pistol Ridge sector, in Pearl River County.

Their discovery well, 1 Pigford et al, in 3-1s-14w, testing casing perforations at 9,080-86 ft., in sand about 250 ft. in the Lower Cretaceous horizon, flowed initially at the rate of 6 bbl. of 43°-gravity oil per hour through 7/64-in. choke. It made 88 bbl. in 15 hours. Flowing pressure gaged 1,230 psi.

Present production in the area, extending more than 10 miles long and 3 to 4 miles wide, is from Eutaw and Tuscaloosa sands, of Upper Cretaceous age, and Wilcox sand, of Tertiary age.

EASTERN INTERIOR

ILLINOIS

In Saline County D. L. Foote 1 May Unit, NE SE NE 34-8s-6e, 3 miles north of Harrisburg, is testing the Waltersburg sand at 2,045-54 ft. A drill-

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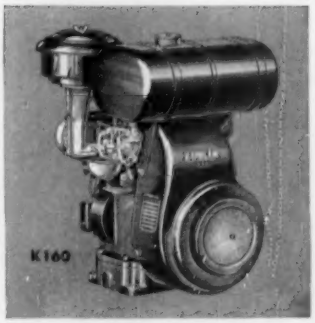

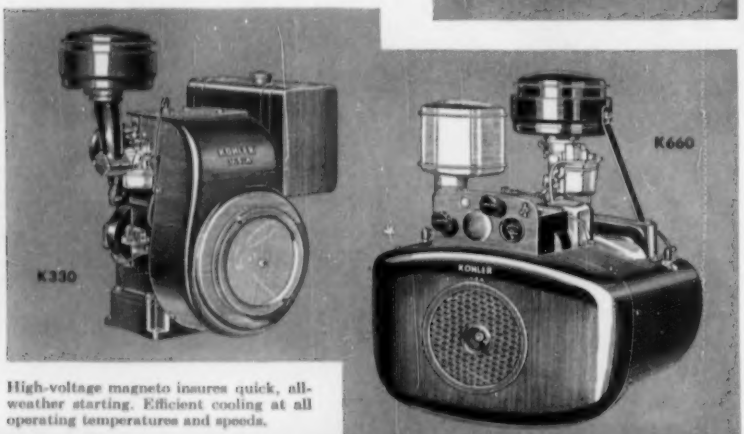

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stem test at 2,011-55 ft. recovered 225 ft. of oil, 115 ft. of mud-cut oil, and 110 ft. of oil-cut mud. This is a 4-mile wildcat.

● In Hamilton County Stewart Oil Co. 2 William heirs, SE NW SW 16-6s-6e, 5 miles south of McLeansboro is flowing 960 bbl. of oil per day after fracturing in the Aux Vases at 3,072-86 ft. The well is ½ mile of Dale pool.

APPALACHIAN

PENNSYLVANIA

New York State Natural Gas Corp. has drilled three successful wells in southern Potter County, and northern Clinton County, Pennsylvania, near the headquarters of Greenlick Run. The first well, completed January 23, led to discovery of a new Oriskany gas pool in southern Potter County.

The pool, known as Greenlick, is located on the southeastern flank of the Wellsboro anticline, and is on State Forest lands. The new pool is northeast of, and entirely separated from the two pools at Leidy and Tamarack, which were discovered in 1950 and 1952.

The orginal open flow for the first well drilled was 32,500,000 cu. ft. and the rock pressure was 4,240 psi. A second well in the same pool was brought in by New York State Natural on March 5. It had an estimated original open flow of 45,000,000 cu. ft., and the rock pressure was 4,030 psi.

A third well in this same Potter County area came in March 31 with an estimated original open flow of 52,000,000 cu. ft. The rock pressure was 3,520 psi.

The three wells are being produced by the most efficient and modern methods, thus assuring maximum recovery from the reservoir.

● Parker Township, Butler County, Southwest Pennsylvania, Walker et al 1 John Walker, wildcat, is reaming at 7,392 ft.

● Buffington Township, Indiana County, Felmont Oil Corp. 1 Marjorie Shankel is drilling at 504 ft.

● Unity Township, Westmoreland County, Peoples Natural Gas Co. 2-4037 Fred Musnug, commenced drilling and is at 78 ft.

WEST VIRGINIA

In Davis district, Tucker County, West Virginia, Blaho Oil & Gas Co. 1 Willie J. Trout, wildcat, elevation 2,310 ft., was dry. A show of gas and water was at 2,425 ft. Total depth 4,056 ft.

● Licking district, Hope Natural Gas Co. 9924 Alex Nestor, elevation

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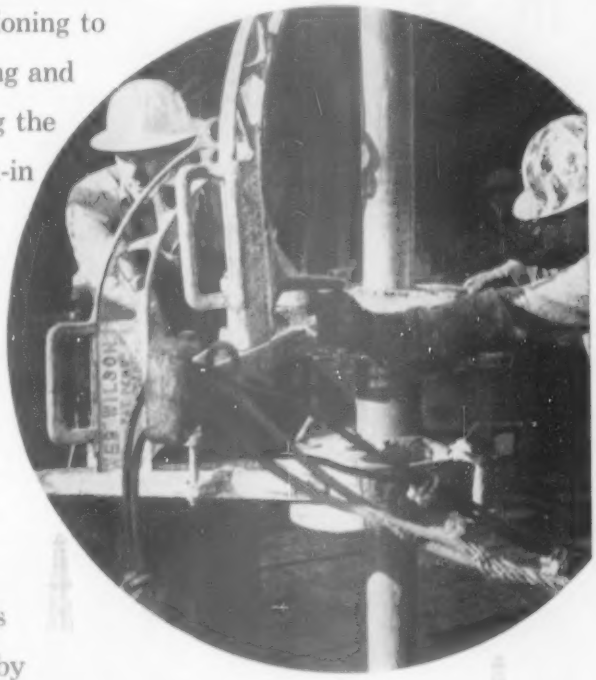

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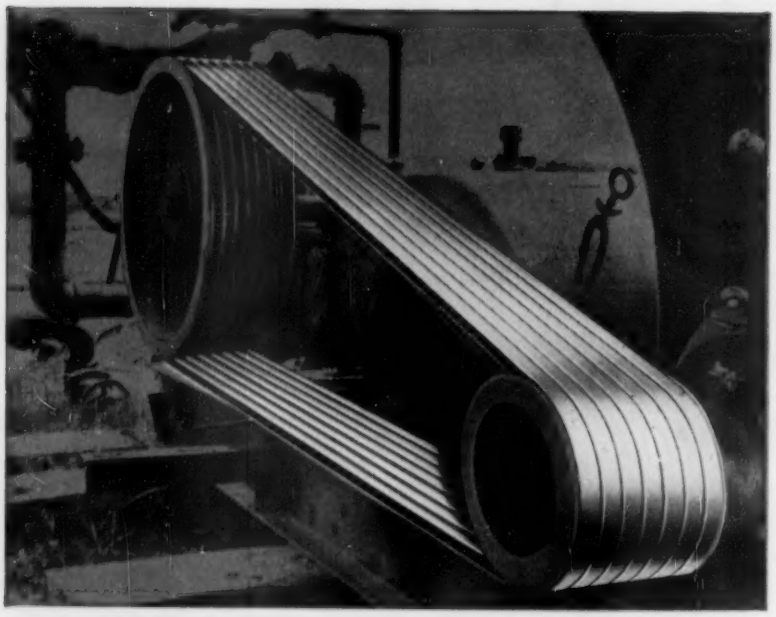

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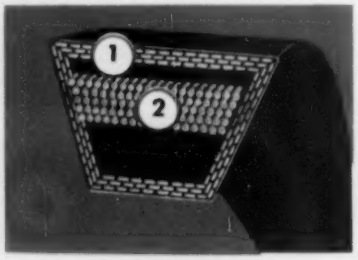

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1,764 ft., is drilling at 4,704 ft. in the Oriskany sand topped at 4,644 ft.

● Union district, Preston County, Columbian Carbon Co. 1207 Lawrence Burger, elevation 2,543 ft., announced the Onondaga at 4,799 ft., chert 4,859 ft., and the Oriskany sand at 4,985 ft., where it is shut down to run a liner in the hole.

OHIO

Ohio Fuel Gas Co. completed a second Newburg well in northern Hinckley Township, Medina County. On 1 E. Nicholson, Lot 6, the sand was topped at 2,992 ft. and drilling stopped in sand at 3,005 ft. The test gaged 325,000 cu. ft. natural and 825,000 cu. ft. after acid treatment.

● Frank Lyons et al first offset to their discovery on Colopy in Union Township, Knox County, apparently is the better well, gaging 1,100,000 cu. ft. natural. On 1 W. Emmett, Section 6, Clinton was logged at 2,828-51 ft. and will be fractured before completion.

● Wiser Oil 2 B. Devore, Section 5, Tiverton Township, Cochocton County, with sand 3,200-65 ft., gaged 50 bbl. and 750,000 cu. ft. gas after treatment.

GREAT LAKES

MICHIGAN

Another Traverse Well Due Ensley Field in Newaygo

Another Traverse oil well was in prospect in Ensley field, Newaygo County, as the James J. McGerry, Trustee 3 Butler, SW SW NE 7-11n-11w, showed for about 300 ft. of free oil natural from Traverse pay logged at 2,430-31 ft.

If this well is a commercial one, it will mark the fifth successful completion, including the discovery, in Ensley pool, fourth immediately around the discovery well.

Rotary Rigging Up at Niagara Follow-Up Test

Sun Oil Co. is rigging up rotary tools in NE SW SW 10-3s-9e, Romulus Township, Wayne County, to begin drilling of the first follow-up Niagara obective gas test to International Salt Co.'s recent 8,000-M.c.f. per day blowout well.

The International Salt Co. core hole, located in the approximate NE SE NW 15-3s-9e, ran into problems after gas started to show when core barrel and diamond bit were lost in a small diameter hole. This hole was plugged after core barrel and bit had been recovered.

The announcement of this gas show stimulated an active leasing program in the area, but the sprawling 2,000-acre Wayne County Airport, which may or may not be leased for oil and gas development eventually, has limited the amount of lands available for private leasing. Sun, The Taggart Co., Basin Oil Co. and others have the bulk of the acreage to the north and northwest-northeast of the gas-showing core hole which was located just across the fence line north of the Airport. Niagara gas objective at this first new test should be logged between 1,950 and 2,100 ft.

ROCKY MOUNTAIN

WYOMING

Tensleep New Pay Tested at West Sussex

Continental Oil Co. recovered 1,320 ft. of oil on 1½-hour test of Tensleep at 75 Unit, NW NE SE 8-42n-79w, for an apparent new pay discovery in West Sussex field The well is 5 miles west of previous Tensleep production in Sussex proper.

Test was of the interval 7,367-93 ft., and recovered, in addition to the oil, 180 ft. of oil-cut muddy water and 180 ft. of oil-cut mud. At the end of the test flowing pressure reached 720 psi. An earlier test at 7,340-69 ft. recovered 70 ft. of oil with 190 ft. of oil-cut mud. At last report Continental was coring below 7,393 ft.

Tensleep production was found in Sussex and in Meadow Creek fields in 1951, but no deep test has previously been drilled in West Sussex field. In a south extension of Tensleep production Bentex Oil Co. and Plymouth Oil Co. are running production string at I Taylor, NW NW NE 26-42n-78w. This well ½ mile south of Tensleep in East Sussex field, and 2½ miles north of nearest Tensleep production in Meadow Creek. Drill-stem test in this well recovered 1,980 ft. of oil with top of Tensleep logged at 9,315 ft.

NORTH DAKOTA

Amerada Suspending Fryburg Development

Amerada Petroleum Corp. has suspended development drilling in the Fryburg field, Billings County. Suspension is a result of performance of the 12 wells completed in the field. Only three of 10 wells actually produced during the month of February made their allowables. Typical of field performance is that of 1 May, NW NE 9-139n-100w, the discovery well. It was completed for a flow of 271 bbl. per day, 3 per cent cut. At completion, tubing pressure was 200 psi. During February it was produced for 17 days with an average recovery of 168 bbl. of fluid per day, 17 per cent water, under tubing pressure of 50 psi. Fryburg has 11 Madison completions, with one producer from Heath which was a failure in Madison. The well has been shut in with no market for the heavy crude produced from Heath. No dry holes have been completed in the field.

COLORADO

Golden Area Wildcat At Total Depth

S. D. Johnson, Denver independent has reached total depth below 10,351 ft. at 1 Farmers Highline, SE SE NW 7-3s-69w, in the Golden area, Jefferson County. No data has been released. Tests were run during drilling at the

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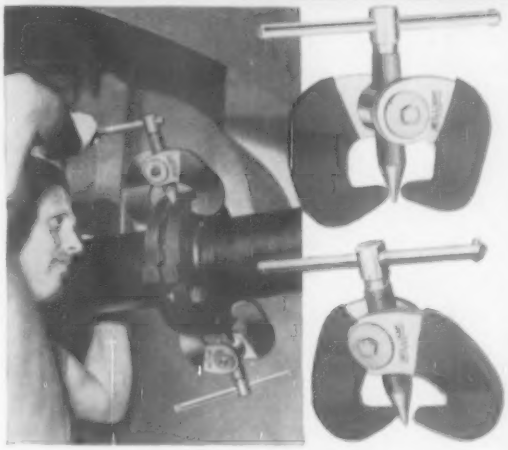

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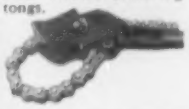

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well, with all information withheld. The wildcat was scheduled to go to Skull Creek at 10,000 ft, and is the second deep test along the mountain front in the area west of Denver by this operator. The first, in the Morrison area, was a discovery, but complete information has not been released.

Kiowa County Wildcat Staked

Warren-Bradshaw Exploration Co. and Tennessee Gas Transmission Co. have made location for a 5,000-ft. test of Mississippian at 1 White, C SW SE 29-19s-45w, Kiowa County. The well is on acreage farmed out from Continental Oil Co. It is 18 miles southeast of the town of Eads.

Continental conducted a sizable exploration program through this area in 1952. One small gas discovery southwest of Eads resulted, and shows were also found in 1 White, SE SE SE 20-19s-45w, in the vicinity of the new wildcat location. The district on the southern flank of the Denver-Julesburg basin along the Las Animas arch has had exploration at intervals for the past several years, but has been relatively inactive during recent months.

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WESTERN CANADA

SASKATCHEWAN

Success Reported at Ralph Area Step-Out

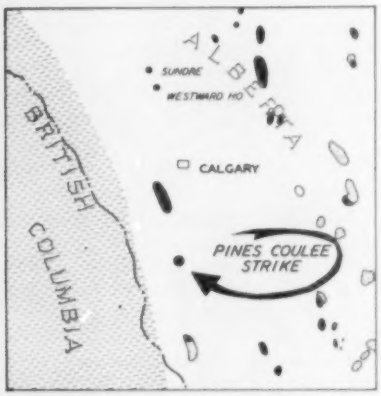
Central Leduc Oils, Ltd., and Del Rio Oil Producers, Ltd., have indicated oil success at their 1½-mile step-out venture in the Ralph area of southern Saskatchewan, about 10½ miles southeast of Weyburn.

The well, Central-Del Rio-Hudson's Bay 10-8 Ralph, LSD 10, 8-7-13w2, is 1½ miles northeast of the Mission Canyon oil discovery made by the team.

ALBERTA

Gas-Condensate Strike Hinted at Parkland Test

Texaco Exploration Co. has made a natural gas-condensate strike at their current driller in the Parkland area of southern Alberta.

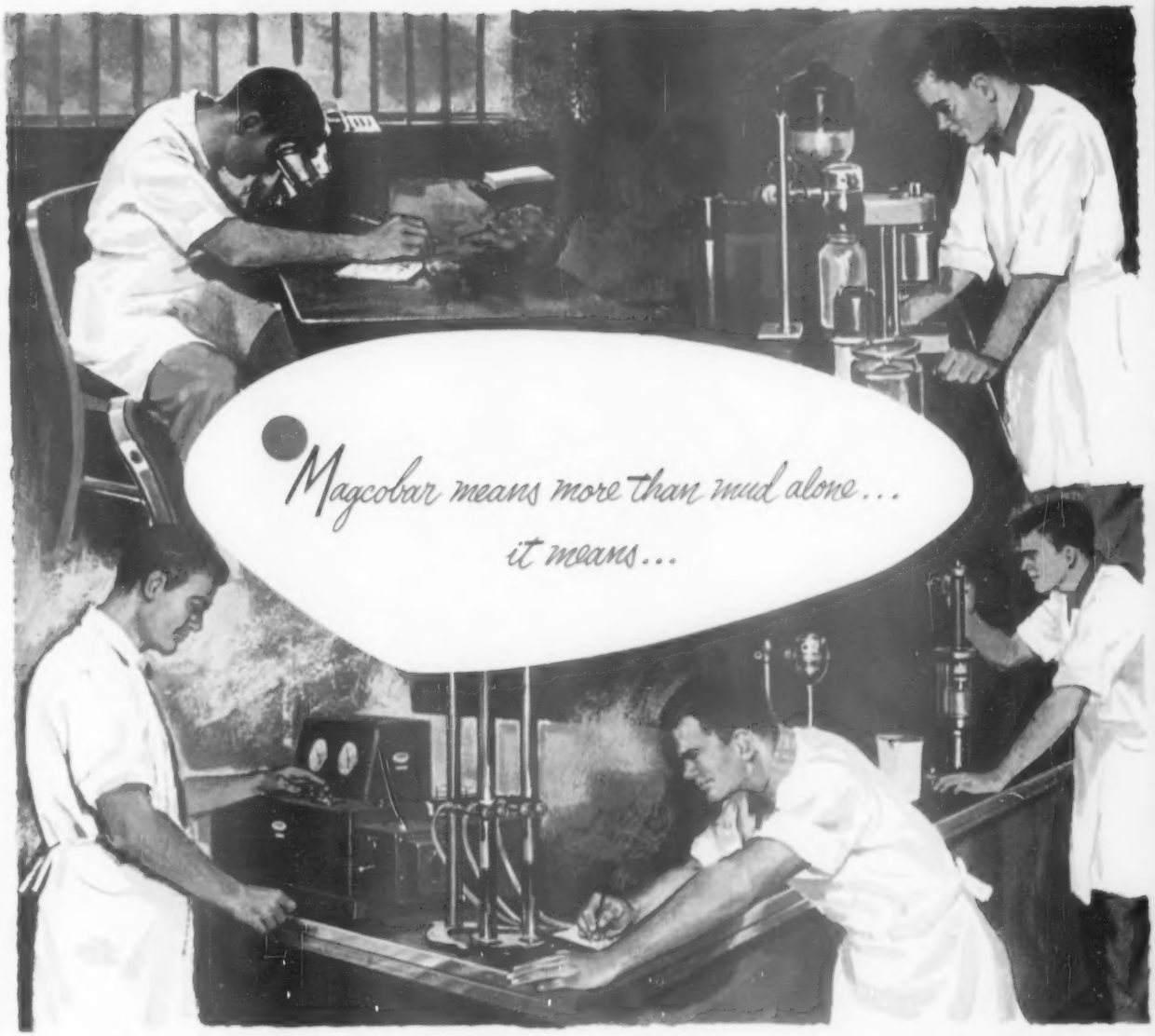


Texaco Exploration Co. found wet gas in the Madison-Mississippian lime at a wildcat in the Pine Coulee-Parkland area of southern Alberta, 55 miles south of Calgary.

The discovery well, Texaco-Baysel A13-4 Pine Coulee, LSD 13, 5-15-28w4, is 55 miles south of Calgary. Maximum gas flow rate was about 6,000 M.c.f. per day with pipe recovery of about 150 ft. of condensate, 175 ft. of oil-cut water, and 400 ft. of black sulfurous water. The test was run in the Madison.

Basal Quartz Gas Strike in Carbon Area

Shell Oil Co. has a gas discovery in the basal quartz formation at its wild-



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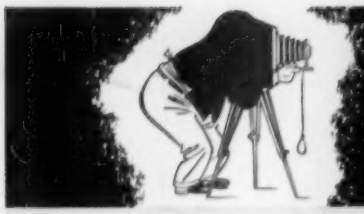
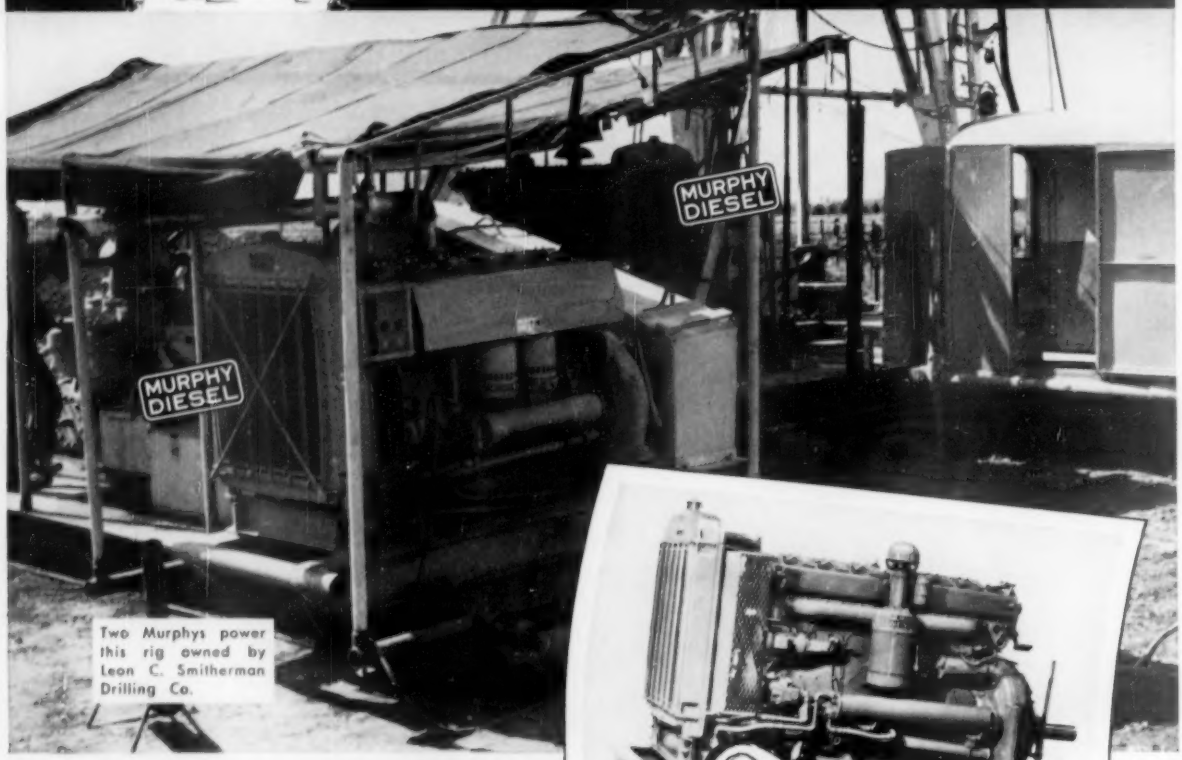
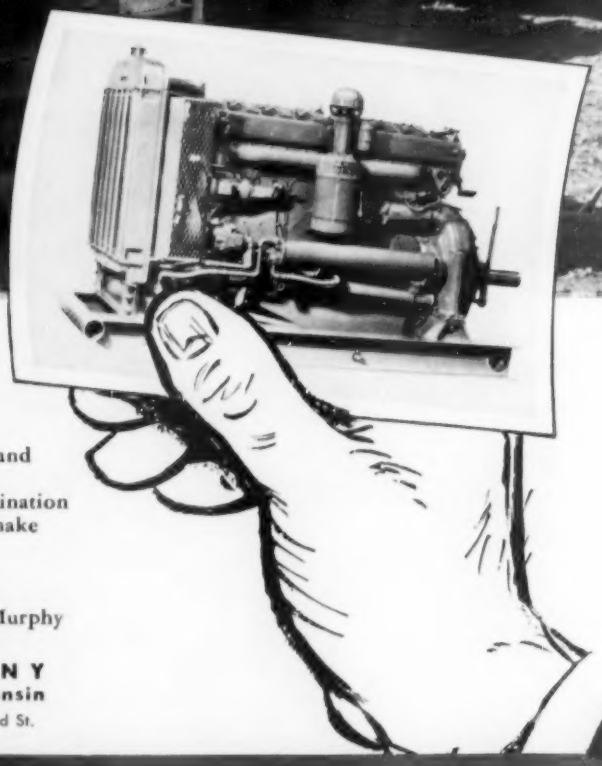


MURPHY DIESEL IN THE PICTURE



Two Murphys power this rig owned by Leon C. Smitherman Drilling Co.



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cat in the Carbon area of southern Alberta, 17 miles northwest of Drumheller and 50 miles northeast of Calgary.

The discovery well, Shell A7-31 Carbon, LSD 7, 31-29-22w4, tested at 4,823-45 ft. in the basal quartz, recording a flow rate of 7,000 M.c.f. of gas per day. Effective pay thickness of the formation was about 20 ft.

PACIFIC COAST

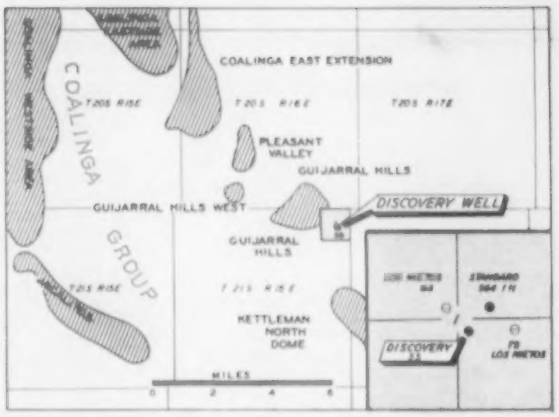
CALIFORNIA

Extensioners Expand Polvadero Discovery

The new Polvadero field in the Coalinga area of Fresno County received a northeast extension and an eastern stepout has indicated it will make a producer in the 10,600-ft. Eocene sand. The former, Standard Oil Co. of California 564 1H topped the Bourdieu sand at 10,660 ft. and was bottomed at 10,758 ft. On a 13-hour test it flowed 27°-gravity crude at a 1,600-bbl. daily rate.

Los Nietos Co., operator 75-1 Bourdieu, two locations east of the discovery, found the sand structurally lower but was expected to have about 75 ft. of pay sand. It was coring ahead at 10,907 ft. Its 44 Sanger was coring at 10,500 ft.

Extent of the Gatchell sand field is yet to be determined. It could be of major importance but will not approach the famous Coalinga Nose field 6 miles northwest, which also produces from the Gatchell. The Polvadero pay is thinner and much tighter. Per-acre foot recoveries are expected to be considerably smaller.



Deep Shell Test Near Bakersfield Promising

Shell Oil Co.'s Eocene test in the Canal area west of Bakersfield has indicated it might produce from a lower Miocene pay as well as in a middle Miocene zone. On a formation test below 12,400 ft., possibly in Vedder sands, the wildcat reportedly gave favorable showings. After the test Shell 1 Posuncula continued to core ahead toward a scheduled 15,000-ft. depth.

About 2 months ago it yielded 6,900-ft. of 30°-gravity crude on a formation test at 9,535-92 ft. This would open a new deeper field in the area between Canal field production and Strand field, about 1 mile northeast.

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Sur. A-9. IPP 162 BOPD, 22.3°, perfs. in Poth sand at 1,362-66 ft. TD 3,400 ft. (Oil discovery well).

TEXAS GULF COAST

District 2

Goliad County: Kirkwood & Co. and W. Carlton Weaver 1 John Yanta, M. J. y'Barvo A-51. IP 32,500 M.c.f. of gas per day, open flow, GLR 23,800:1, perfs. 7,538-42 ft., 55.3°. Top Wilcox pay 7,538 ft. TD 8,018 ft. (Gas-distillate discovery well).

Live Oak County: Producers Corp. of Nevada and Seeley et al 1 H. F. Steinmeyer, M. G. Fraizer A-999. IPF 48 BOPD, ⅛-in. choke, GOR 680:1, perfs. 3,188-92 ft., 23.1°. TD 4,769 ft. (Discovery of Seeley field).

TEXAS GULF COAST

District 3

Galveston County: Pure Oil Co. A-1 OCS Lease 0109, Gulf of Mexico Block 189. IPF 146 BOPD, 9/64-in. choke, 37.1°, top pay 7,522 ft., perfs. 7,522-28 ft. TD 10,333 ft. (Offshore oil discovery).

Carnes W. Weaver 1 Fred C. Pabst Est., et al Unit, A. Edwards A-10. IPF 185 BOPD, 16/64-in. choke, 34.3°, top Frio pay 8,030 ft., perfs. 8,030-44 ft., GOR 579:1. TD 8,775 ft. Opens Fault Segment 2 field (Frio), opens Northeast field.

Hardin County: W. P. Luse and J. B. McAdams et al 1 Turner heirs, Turner & Von Rosenberg A-585. IPP 25 BOPD, 36.8°, perfs. Yegua 7,904-23, 7,936-47, and 8,000-05 ft. TD 9,718 ft. New pay discovery at Yonajosa.

Jefferson County: Adams & Haggarty 5 Marrs McLean, EL&RR 373 A-551. IPF 170,000 M.c.f. of gas per day, open. 40.5°, GLR 157,000:1, perfs. in upper Hackberry 9,042-57 ft. TD 9,100 ft. New gas-distillate pay in Big Hill field.

Clegg & Hunt et al 4 J. H. Phelan et al, HT&B 1, A-138. IPF 33,000 M.c.f. of gas per day, open flow, 59.8°, GLR 46,104:1, perfs. in Hackberry 7,857-62, 7,865-73, and 7,876-90 ft. TD 7,965 ft. New pay at Phelan. Opens first gas production across fault from oil production.

Liberty County: Sparta Oil Co. 1 Hutchins & Pearson, W. E. Bell 32, A-657. IP 210,000 M.c.f. of gas per day, open flow, perfs. lower Frio 7,168-73 ft. TD 7,250 ft. Gas discovery at Hillje.

KENTUCKY

Todd County: Central Drilling Co. 1 Walker, NE NW NE 10-G-27. IPP 80 BOPD, McClosky lime 935-540 ft. TD 940 ft. (Discovery of Lone Star pool).

SOUTH LOUISIANA

Allen Parish: H. L. Hunt 1 S. J. Albert Bel et al, 33-5s-4w. IPF 20 BCPD, 3,474 M.c.f. of gas per day, 24/64-in. choke, open hole at bottom of drill pipe. TD 9,310 ft. 64°. (Gas-distillate discovery).

St. Bernard Parish: Continental Oil Co. 1 State Mineral Board Lse. 2511-Main Pass Block 25, offshore. IPF 54 BOPD, ¼-in. choke, 22°, perfs. 6,224-30 ft. TD 10,002 ft. (Oil discovery).

Terrebonne Parish: Superior Oil Co. 4, LL&E-St. Unit 9, 13-21s-16e. IPF 176 BDPD, 8,528 M.c.f. of gas per day, 22/64-in., 52.3°, GOR 48,460:1. Perfs. 14,908-48 ft. TD 15,054 ft. (New gas-distillate pay discovery in Four Isle field).

NORTH LOUISIANA

Claiborne Parish: Hassie Hunt Trust et al 1 W. H. Thompson et al Unit, 28-22-4w. IPF 228 M.c.f. of gas per day plus 41 BCPD, 9/64-in. choke, 59°, perfs. in Haynesville "A" zone at 10,147-53 ft. TD 11,008 ft. (New pay in Lisbon field).

KANSAS

Graham County: Benson & Montain, Brooks Hall et al 1 Huntington, SE SE SW 7-7s-25w. IPP 146 BOPD, Lansing lime 3,832-40 ft. TD 3,870 ft. (Opens Huntington pool).

Seward County: Panhandle Eastern Pipeline Co. 2-20 Shuck, C NE SW 20-33s-34w. IP 5,000 M.c.f. of gas per day, Morrow sand 5,987-6,008 ft. TD 6,350 ft. (Deep pay discovery and geological wildcat inside Hugoton field).

NEBRASKA

Cheyenne County: British-American Oil Producing Co. 1 Juelfs, C NE NE 23-17n-52w. IPP 269 BOPD, "J" sand discovery, new field. TD 5,340 ft. "J" sand.

Kimball County: Nebraska Drillers 1 Young, SW NE SW 11-14n-54w. IPP 100 BOPD, "J" sand discovery, new field. Young. TD 5,950 ft. "J" sand.

Travis: Shell Oil Co. 1 Travis, C SW SE 15-16n-54w. IPP 130 BOPD, "J" sand discovery, new field. TD 5,940 ft. "J" sand.

WYOMING

Sublette County, Pinedale: El Paso-Continental-Malco 1 Unit, C NE SE 9-30n-108w. IP at rate of 2,400 M.c.f. of gas per day, Fort Union gas discovery, new field. TD 10,550 ft.

ALBERTA

Colorado Oil & Gas Co. 10-15, LSD 10, 15-52-19w4. Indicated Viking gas well. TD 3,387 ft.

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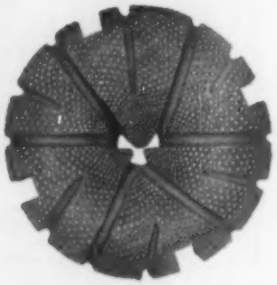

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TRUCO DIAMOND BITS AND D & S CORE BARRELS

Prior in New Job

Standard of Indiana boss worked up from bull gang

FRANK O. PRIOR, fresh out of the Army, in April 1919 bought a train ticket in San Francisco and headed to the East Coast. He wanted a job in the bronze industry, thinking his new engineering degree from Stanford would qualify him.

Prior probably would have landed the job if he hadn't stopped 2 hours in Denver. There he visited a friend in offices of the Midwest Refining Co. and glowing tales of oil developments in Wyoming, especially at Salt Creek field, caught his fancy.

He remembered having previously been recommended for a job as foreman of a bull gang for Midwest. So he canceled his trip east and boarded a train for Casper. He didn't get the foreman's job but signed on as a laborer for Midwest.

This began an oil career which will be climaxed May 3 when Prior becomes the eighth president of Standard Oil Co. of Indiana. The intervening 36 years saw Prior tackle plenty of tough oil industry tasks and attain many achievements. Probably the most noteworthy was his guiding hand in Stanolind Oil & Gas Co.'s meteoric rise.

Moves on up . . . Prior didn't stay long in the labor gang in Salt Creek field. He soon won promotion to electrical and mechanical engineer and supervised designs and construction of the Salt Creek power plant. This job brought him in close association with A. W. Peake, another Stanford engineer who had charge of field engineering operations, and the man Prior was destined to succeed as Standard president.

In 1925 Prior was made superintendent of Midwest Refinery's electrical department and in 1929 moved to Shreveport, La., as chief engineer and general operating superintendent of Dixie Oil Co., an Indiana Standard subsidiary. He rose quickly in the company, succeeding Peake as Dixie president in 1930. Later the same year he he was named first president of the newly formed Stanolind Oil & Gas which was formed to take over Dixie and two other producing subsidiaries of Standard. He moved his headquarters to Tulsa.

Big Stanolind rise . . . Under Prior, Stanolind increased its oil reserves over 10 times in one of the trying periods of the oil industry when crude sold as low as 10 cents a barrel. Stanolind's production of crude rose from a net average of 19,723 bbl. daily in 1931 to a net average of 163,349 bbl. in 1944.

During this period, Stanolind discovered or developed substantial reserves and production in Texas, Louisiana, Oklahoma, Kansas, Wyoming, and Colorado. The firm made 11 major acquisitions of production properties, including the tremendous Yount - Lee purchase of hundreds of producing wells.

The firm pioneered in setting up a comprehensive research program covering exploration, drilling, production, and petrochemical processes. It developed Hydrafrac, the hydraulic forcing open of tight oil formations to increase their yields.

Joins parent firm . . . Prior moved up to Standard Oil in 1945 as a director and vice president in charge of production. He also served as board chairman for the three allied Stanolind firms and in 1951 was elected executive vice president of Standard.

Associates call Prior an "idea man." They say he conceives his ideas with astonishing regularity, tosses them out in frequent informal meetings with heads of operating departments, and if they stand the test are put into use.

He believes in deciding what has to be done and then doing it without useless talk and waste motions. To him, it's what you do that counts, not what you say you'll do.

Prior admits to one major hobby—dry fly fishing—but seldom finds time to practice it. He once played golf, even laid out a course at Salt Creek, Wyo. But the Rocky Mountain ticks made the course unplayable. In recent years, lack of time has kept him off the fairways.

Prior has two sons. Both have taken to the oil industry as independent operators.

James M. Whatley, former chief geologist for Union Sulphur & Oil Corp. and more recently a consultant, is the new Houston division manager for Colorado Oil & Gas Corp., Denver. **Russell E. Ferrell, Jr.,** formerly with J. S. Abercrombie Co., is division production superintendent and engineer.

Emile E. Soubry, vice president and director of Standard Oil Co. (N. J.), has been elected a member of the company"s executive committee. Soubry has been a member of the board since January 1949 and a vice president since December 1951. He has been with Jersey Standard 43 years.

Clyde N. McCarty has been named president of Flint Rig Co., oil-field contractors of Tulsa. McCarty joined Flint

C. N. McCARTY

M. HUNTSBERRY

in 1937 and worked as an engineer in Texas and Kansas before becoming district manager at Salem, Ill. He became executive vice president and general manager in 1946. **M. D. Huntsberry,** secretary-treasurer of the firm, was named to the board of directors. Huntsberry joined Flint in 1953 after having served as administrative assistant to the manager of production of Gulf Oil Corp.'s Tulsa division.

Paul F. Miller has been named manager of the industrial-relations department of American Oil Co. Miller, a chemical engineer, joined Standard Oil Co. (Ind.) in 1929. In 1936, he was assigned to American's refining subsidiary, Pan American Refining Corp. in Texas City, Tex., where he became

PERSONALS

assistant general superintendent in 1948. He was named manager of industrial relations for the manufacturing department in January 1954.

B. B. Coester, district geologist at Casper, Wyo., for Atlantic Refining Co., has been promoted to regional geologist. He will supervise four district offices: Casper; Billings, Mont.; Bismarck, N. D.; and Durango, Colo.

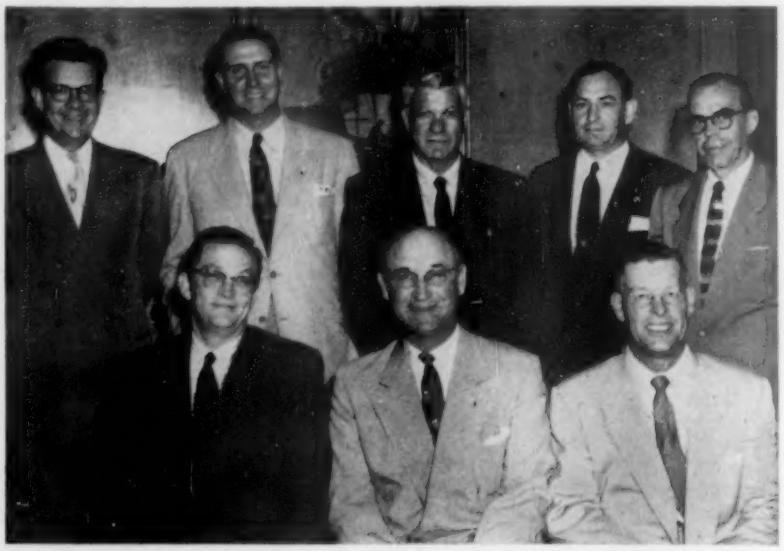
Paul R. Taylor, Houston, has been elected president of Industrial Gas Supply Corp. succeeding **George H. Clifford,** named chairman of the board. Industrial Gas is a wholly owned subsidiary of Stone & Webster, Inc., which Taylor also serves as vice president. The company produces, purchases, and distributes natural gas to large industrial users in the Houston area.

Don O. Freeman has been named a vice president of Warren-Bradshaw Exploration Co. Freeman, a graduate of the University of Oklahoma, joined Warren-Bradshaw in 1949. He served for several years as assistant to the president and in November 1954 was appointed manager of the land-geological department.

Lawrence Wolff, executive assistant to the vice president of Union Oil Co. of California, will retire from the company June 1 after 43 years of service.

Robert F. Duncan has been elected to the newly created position of executive vice president of Calumet Refining Co. Duncan has been serving as secretary and treasurer since 1950. He has been a member of the board of directors since 1950.

Parker Kendall, manager of refining for Sinclair Refining Co. in Texas will retire effective June 1. Kendall first went to Houston in 1920 as chief clerk of the Sinclair refinery. He was promoted successively to night foreman, assistant superintendent, and superintendent before he was named coordinator of Texas operations on Sinclair's New York staff in 1943.



Houston Chapter of Nomads Elects Officers for 1955

The Houston Chapter of Nomads recently elected its slate of officers for 1955. Officers elected were, seated left to right, W. L. Childs, Jr., Reed Roller Bit Co., president; W. C. Hedrick, McEvoy Co., vice president; and E. M. Fontaine, National Tank Co., senior regent. Standing left to right, Harry E. Estes, Oil Well Survey Instrument Co., executive secretary; R. H. Franklin, Rollo Manufacturing Co., junior regent; F. M. Prell, A-1 Bit & Tool Co., sergeant-at-arms; B. H. Prickard, Tuboscope Co., assistant secretary; and E. W. Londen, Baroid Division, National Lead Co., treasurer. H. Ben Young, Mission Manufacturing Co., secretary; A. L. Smith, Petroleum Instrument Co., assistant treasurer; and B. O. Ellington, Baker Oil Tools, Inc., deputy sergeant-at-arms, were not present when the picture was made.

Frank E. Kalbaugh has been named manager of the newly formed Southern Pacific Pipe Lines, Inc. The pipelines of the company will be constructed from the Los Angeles and El Paso refinery areas to Tuscon and Phoenix, a total of nearly 800 miles. Kalbaugh will headquarter in Los Angeles.

H. S. Gibson, managing director of Iraq Petroleum Co., Ltd., has returned to London after a month's visit to oil centers in the United States and Venezuela.

Robert C. Mason, who has been serving as an exploration geologist with Phillips Petroleum Co. at Billings, Mont., has been promoted to development geologist and transferred to Houston.

O. H. Ingram and **Edward C. Mishou** have been elected to the board of directors of Minnesota Pipe Line Co., St. Paul. Ingram is president of Ingram Products Co., petroleum products marketing firm with offices in St. Paul and a refinery at Nashville. Mishou is general manager of the pipeline firm, which last fall completed construction of a 260-mile, 16-in. crude-oil line from Clearbrook, Minn., to Pine Bend, Minn.

V. L. (Jack) Frost has been promoted to assistant division geologist at Sidney, Neb., by Ohio Oil Co. Frost has been with Ohio in Sidney for 2 years. Previously he served 11 years in the company's Tulsa division. **William Neiler,** former district geologist at Bismarck, N. D., for Ohio, has been transferred to Casper, Wyo., as district geologist.

W. J. Greenwald, assistant chief reservoir engineer at Houston of Humble Oil & Refining Co., has been transferred to the East Texas division as assistant petroleum engineer. He was replaced in Houston by **H. B. Barton,** former assistant area petroleum engineer in California. Barton is being replaced by **C. M. Carothers,** district petroleum engineer at Stratton, Southwest Texas division. **R. B. Riggs, Jr.,** district petroleum engineer of the Gladewater district, has been transferred to the petroleum engineering division, Houston, as senior petroleum engineer.

PERSONALS

Harry Ptasynski, geologist with Pure Oil Co., has been transferred from Amarillo, Tex., to Casper, Wyo.

J. L. Lookinghill, geologist with Atlantic Refining Co., has been transferred from Albuquerque, N. M., to Durango, Colo.

Sam T. Boltz, Jr., petroleum engineer with The Texas Co., has been transferred from the company's Salem, Ill., unit to Wilson Creek, Colo.

James W. Harrison, former chief engineer with Delta Refining Co. at Memphis, has resigned and joined Lion Oil Co. as plant engineer at its Diamond M natural-gasoline plant at Snyder, Tex.

Dan M. Krausse, former assistant to the president and general manager of Cosden Petroleum Corp., Big Spring, Tex., has been promoted to manager of manufacturing. Krausse joined Cosden on November 1, 1949 as control engineer. As assistant to the president, he had been handling duties in the manufacturing department.

Rexford S. Blazer, president of Ashland Oil & Refining Co., has been installed as president of the Kentucky Chamber of Commerce for 1955.

L. O. CROCKETT

L. O. Crockett has been named manager of the newly formed chemical department of Gulf Oil Corp. Before his promotion, Crockett was manager of the petrochemical activities unit and manager technical division, manufacturing department. **Dr. Alexander Lewis, Jr.,** has been named manager of the chemical marketing division of the new chemical department, and **V. N. Hurd** has been chosen director of the chemical development division.

William A. Sidwell, Jr., former division landman for United States Smelting Refining & Mining Co. at Midland, Tex., and **Thomas R. Lyons,** former area geologist for Stanolind Oil & Gas Co. at Abilene, Tex., have organized Sidwell & Lyons, Inc., at Denver. The firm plans to operate in southern Rocky Mountain area.

J. B. Rogerson, former manager of manufacturing of Lion Oil Co., was elected vice president in charge of manufacturing at a recent meeting of the directors of the company. Other newly elected vice presidents were **R. C. Tallman,** vice president in charge of research; **J. H. Sheehan,** vice president in charge of petroleum sales; **E. W. Atkinson,** vice president and treasurer; and **Jeff Davis,** vice president and general counsel.

DEATHS

Marvin Duff Smith, 45-year-old internationally known chemical engineer and southern division general manager of Foster Wheeler Corp., died of cancer last week in a Houston hospital. Foster Wheeler's general manager in Houston since 1944, Smith was a graduate of the University of Oklahoma and did graduate work at Massachusetts Institute of Technology. He supervised the building of refineries at Bari and Leghorn, Italy, before World War II, helped Allied intelligence destroy them from the air in the war, and then helped rebuild refineries in France, Great Britain, Italy, and Greece after the war.

J. Sam Muckleroy, president of Muckleroy Drilling Co., died last week in Houston after a short illness. Muckleroy worked for an oil-field supply firm in Longview and Beaumont before forming his own drilling company in Houston after the war.

Herman D. Cornell, 67, independent oil operator of Tulsa and Fort Worth, died April 19 after a long illness. Cornell started in the oil business in Tulsa and was active in the development of the Ada oil field.

Henry Nelson Rose, independent oil producer and father of H. Chapman Rose, assistant secretary of the Treasury, died recently at his home in Lancaster, Ohio.

David S. Googins, 57, former head of Worth Petroleum Co. at Fort Worth and later an engineer for Standard Oil Co. of Texas at Midland, died April 12 in Fort Worth.

Willard R. Spence, 49, treasurer of Buckeye Pipe Line Co., died recently in New York City after a short illness.

Lewis V. Echols, 54, Houston independent oil operator, died April 15 in a Houston hospital.

Harry Sheard, 50, chemist for Bayou State Oil Co., Vivian, La., and former chemist for Crown Central Oil Co., Houston, died recently at Vivian.

Jerry Robertson, 62, veteran oil-report publisher and newspaper oil columnist, was killed near Brenham, Tex., April 10 when his car was struck by a train. Robertson, a native Texan and widely known for his colorful western garb, was in Texas doing research on the East Texas field for an article he was preparing for a national weekly magazine. He owned an oil-map service in Evansville, Ind., published a tri-state oil report there, and wrote a syndicated oil column for 16 newspapers in Indiana, Illinois, and Kentucky.

Harry Campbell, 72, retired vice president of Sinclair Refining Co., died April 15 at his home in Glenside, Pa. Campbell, a graduate of the U. S. Naval Academy, joined Sinclair in 1922.

Frank Ross, 72, retired independent oil operator, died April 17 in a Tulsa hospital. Ross, who came to Tulsa about 12 years ago, spent most of his life in the Wichita Falls, Tex., area.

Oscar Ray Murphy, 28, of Lion Oil Co.'s production division at Fort Morgan, Colo., was killed recently in a highway accident near Fort Morgan.

J. R. Schulte, 71, Tulsa independent oil operator, died April 17 in a Hobart, Okla., hospital. Schulte was directing drilling operations on an oil well near Hobart when he suffered a heart attack.

Jessie Orin Lewis, 38, tool pusher for B. L. McFarland Drilling Co., Odessa, Tex., was killed in an automobile accident near Crane, Tex., April 16.

A. D. Cochran, 73, partner in Vierson-Cochran Oil Co. and vice president of Penmar Oil Co., died April 15 at Okmulgee, Okla., after a short illness. He had been in ill health since suffering a stroke about 6 months ago.

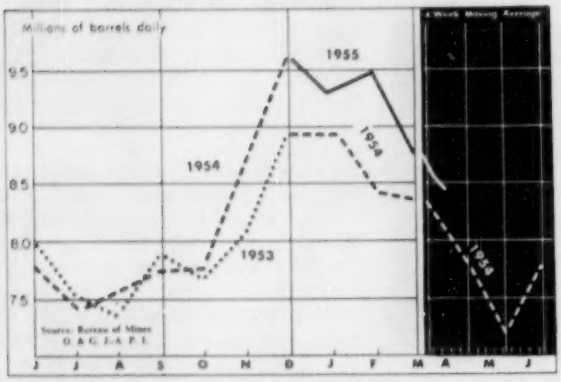
William Warren Bradley, 74, East Texas oil and lumber man, died recently in Gladewater, Tex.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,834,750	UP	17,250	UP	219,097
Crude stocks	269,051,000	UP	2,488,000	DOWN	185,000
Completions	1,106	DOWN	5	UP	69
Refinery runs	7,131,000	UP	139,000	UP	216,000
Gasoline stocks	181,864,000	DOWN	1,321,000	UP	4,260,000
Distillate stocks	63,360,000	UP	1,426,000	UP	6,326,000
Four-product stocks	309,416,000	UP	981,000	UP	12,667,000
Total imports	1,226,500	UP	149,900	UP	481,600

TOTAL DEMAND—ALL OILS



First-Quarter Gasoline Stock Gains Call for Early Summer Reductions

GASOLINE markets are still influenced by the abnormal stock buildup in 1953, but the effects can be wiped out in 1955 if gasoline production is tailored to meet actual demands.

However, the trend in gasoline inventories since the first of the year has been closer to the 1953 pattern than the corrective program of 1954.

Since the end of World War II, gasoline stocks at the end of the year have averaged about 5.7 per cent higher than at the start of the year. For the same period, domestic demand for gasoline has gained on an average of 6.7 per cent a year. Since there is no shortage of gasoline in storage, these percentages show that better distribution facilities have made it possible to operate on less storage for each million barrels marketed.

Gasoline stocks gained only 1 per cent in 1952 because reduced production during the refinery strike resulted in lower-than-normal supply for the year. However, refiners made up this loss early in 1953 and continued the high rate of production throughout most of the year. Gasoline stocks were up 17.2 per cent for the year.

It tok a break in the gasoline market last summer to cut gasoline production enough to help offset the abnormal stock increase in 1953. Gasoline stocks at the end of 1954 were about 1.6 per cent less than at the start of the year.

If the three abnormal years 1952, 1953, and 1954 are considered as a single period, gasoline stocks increased about 16.5 per cent or a little less than the postwar average of 5.7 per cent a year. The gasoline-stock level for the end of 1954 was considered satisfactory.

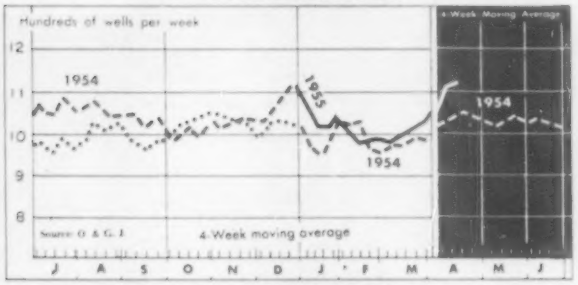
For the first quarter of 1955, gasoline stocks were building up much faster than in 1954 but not quite as fast as in 1953. Stocks at the end of March were 19.1 per cent above first-of-the-year level compared with a gain of 14.8 per cent last year and 19.6 per cent in the first quarter of 1953.

Refinery production of gasoline between now and the first of June will be a major factor in determining gasoline prices during the peak gasoline season.

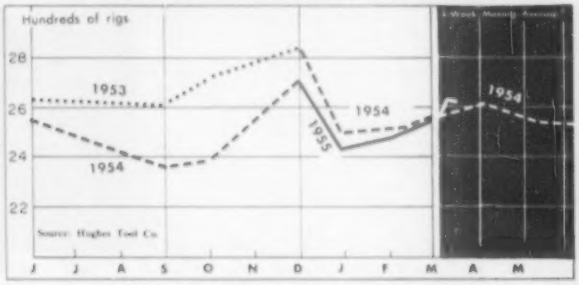
For the postwar period, gasoline stocks have averaged dropping back to the first-of-the-year level by sometime early in August. Weak gasoline markets early in the season last year favored reductions in output, resulting in earlier decreases in stocks. Better demand for gasoline in the early fall, combined with reduced production, brought gasoline stocks at the end of October to 94.8 per cent of the total at the start of the year. The low point for 1953 was 5.2 per cent above stocks on January 1 of that year.

Minimum stock-reduction targets for refiners should be set to bring gasoline stocks down to 175,000,000 bbl. by the end of May and to 165,000,000 bbl. by the end of June. However, markets will be nearer normal and stocks will be well within safe limits if inventories can be cut to 170,000,000 bbl. by May 31 and to 160,000,000 bbl. by June 30. Early stock reductions will take distress gasoline off the market before it can depress prices.

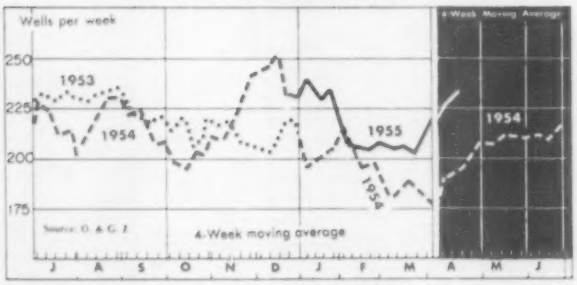
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS*

Area—	4-18-55	Change from 4-11-55	Change from 4-19-54
Gulf Coast	587	6	16
N. and W. Texas-New Mexico	860	—12	43
Arkansas-N. Louisiana-E. Texas	170	— 3	—16
Oklahoma	324	1	—54
Kansas-S. Nebraska	180	—11	22
Illinois-Eastern	132	1	19
Rocky Mountain	207	— 6	—40
Pacific Coast	155	1	19
Total United States	2,615	—23	9
Western Canada	118	—30	—28

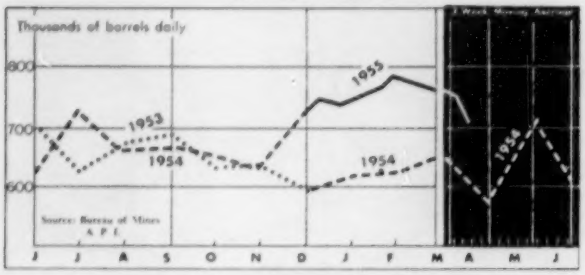
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED APRIL 16, 1955

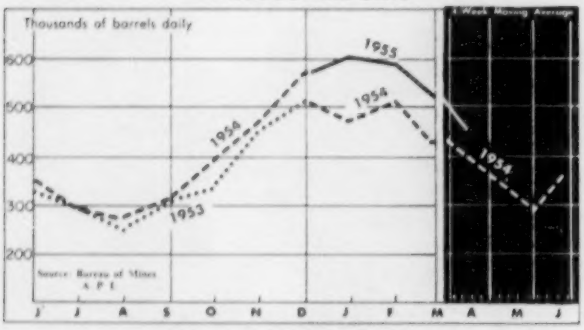
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1955	Cum. 1954	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1955: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	1	0	0	1	8,015	32	36	0	0	0	1	1	0	0	0	31	31
Arkansas	15	7	0	8	54,110	185	185	0	0	0	1	1	10	0	0	50	60
California	57	47	1	9	259,171	729	720	0	0	0	7	7	10	0	2	102	114
Colorado	22	5	0	17	109,048	354	343	0	0	0	13	13	12	0	8	177	197
Illinois	59	31	0	28	128,496	1,028	749	2	0	0	10	12	18	0	0	146	164
Indiana	13	7	0	6	23,878	207	236	0	0	0	2	2	4	0	0	91	95
Kansas	91	43	6	42	331,475	1,430	1,234	2	0	1	17	20	40	1	9	221	271
Kentucky	9	6	0	3	11,683	348	314	1	0	0	1	2	12	0	2	56	70
Louisiana	69	51	2	16	420,586	1,081	913	1	3	0	7	11	34	24	9	104	171
North	38	30	0	8	105,303	567	470	0	1	0	2	3	5	3	1	43	52
South	31	21	2	8	315,283	514	443	1	2	0	5	8	29	21	8	61	119
Michigan	7	0	0	7	16,905	147	169	0	0	0	5	5	3	0	0	59	62
Mississippi	3	2	0	1	27,416	131	106	0	0	0	0	0	2	0	0	48	50
Montana	3	2	0	1	17,304	93	78	0	0	0	1	1	1	0	1	27	29
Nebraska	13	4	1	8	58,332	181	97	3	0	0	6	9	14	0	0	77	91
New Mexico	32	27	0	5	169,258	367	349	2	0	0	3	5	14	1	0	26	42
Northwest	0	0	0	0	0	87	112	0	0	0	0	0	1	0	1	5	7
Southeast	32	27	0	5	169,258	280	237	2	0	0	3	5	13	1	0	21	35
North Dakota	6	5	0	1	50,884	59	62	0	0	0	1	1	0	0	0	10	10
Ohio	16	5	5	6	28,063	297	318	0	0	0	0	0	1	0	2	7	10
Oklahoma	215	119	15	*81	570,497	2,458	2,643	3	0	0	20	23	40	7	13	181	241
Pennsylvania-New York	22	9	6	†7	48,102	444	709	0	0	0	0	0	0	0	5	3	8
Texas	429	264	9	156	1,856,110	5,591	5,145	23	3	3	78	107	218	26	39	1,168	1,451
Southwest (1 & 4)	68	40	1	27	240,863	888	730	3	0	1	16	20	32	7	15	220	274
Gulf Coast (2 & 3)	64	39	4	21	391,387	747	775	6	3	1	8	18	28	16	14	187	245
East (5 & 6)	14	4	1	9	72,103	295	256	1	0	0	7	8	11	1	1	98	111
North Central (7-B & 9)	150	81	0	69	434,959	1,968	1,932	10	0	0	29	39	107	0	1	458	566
West (7-C & 8)	120	88	2	30	674,872	1,403	1,192	3	0	1	18	22	38	0	5	200	243
Panhandle (10)	13	12	1	0	41,926	290	260	0	0	0	0	0	2	2	3	5	12
Utah	5	0	0	5	28,877	19	22	0	0	0	5	5	2	0	2	12	16
West Virginia	11	4	2	5	26,228	174	163	0	0	0	1	1	0	0	2	8	10
Wyoming	5	2	1	2	38,453	231	451	0	0	1	2	3	5	0	3	45	53
Miscellaneous (S. D.)	3	0	0	3	22,841	11	75	0	0	0	3	3	0	0	0	10	10
Total United States	**1,106**	640	48	418	4,305,732	15,597	15,117	37	6	5	184	**232**	440	59	98	2,659	3,256
Total previous week	1,111	636	71	404	4,370,213			33	6	9	199	247	403	53	93	2,475	3,024
Total April 17, 1954	1,037	571	115	351	4,176,845			29	1	11	169	210	404	46	95	2,486	3,031
Western Canada	55	38	2	115	254,820												

Service wells included: *8, †6, ‡1.

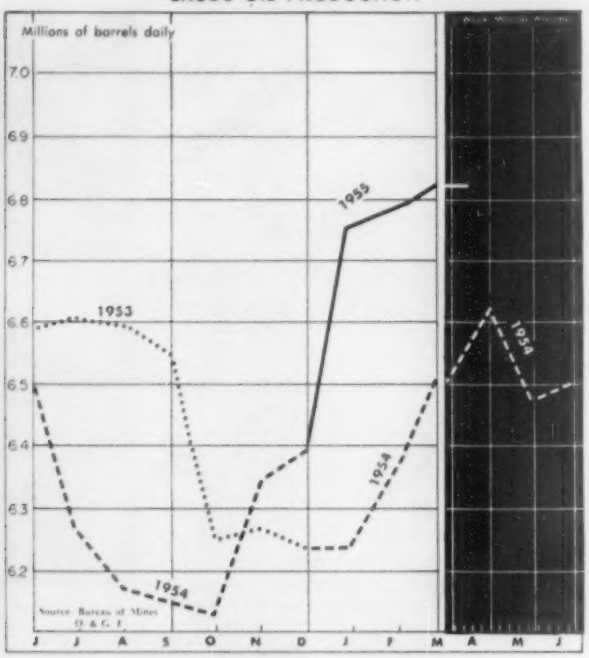
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE OIL PRODUCTION



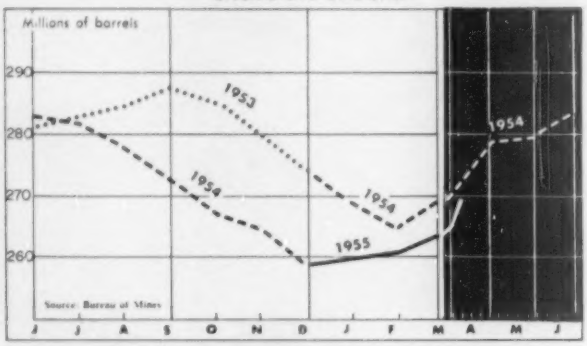
DAILY AVERAGE PRODUCTION FOR WEEK

	April 16			April 9
	Crude oil	Lease condensate	Total	total
Alabama	4,300	.....	4,300	4,200
Arkansas	73,900	400	74,300	73,700
California	973,400	.....	973,400	972,100
Colorado	139,100	.....	139,100	137,300
Eastern	46,500	.....	46,500	46,500
Florida	1,325	.....	1,325	1,325
Illinois	216,000	.....	216,000	212,500
Indiana	28,300	.....	28,300	27,500
Kansas	327,100	.....	327,100	333,600
Kentucky	38,600	.....	38,600	38,300
Louisiana	667,600	54,350	721,950	721,800
North	110,600	3,000	113,600	113,450
South	557,000	51,350	608,350	608,350
Michigan	31,600	.....	31,600	32,600
Mississippi	90,800	5,050	95,850	95,850
Montana	43,100	.....	43,100	42,800
Nebraska	28,900	.....	28,900	29,200
New Mexico	226,325	4,400	230,725	230,625
North Dakota	29,600	.....	29,600	28,700
Oklahoma	570,100	.....	570,100	557,300
Texas	2,893,400	50,500	2,943,900	2,943,900
Dist. 1	54,000	575	54,575	54,575
Dist. 2	150,700	8,100	158,800	158,800
Dist. 3	445,000	23,000	468,000	468,000
Dist. 4	244,000	5,500	249,500	249,500
Dist. 5	47,000	500	47,500	47,500
Dist. 6	124,800	5,400	130,200	130,200
East Texas field	231,200	.....	231,200	231,200
Dist. 7-B	141,000	50	141,050	141,050
Dist. 7-C	195,000	4,500	199,500	199,500
Dist. 8	966,700	2,000	968,700	968,700
Dist. 9	207,000	750	207,750	207,750
Dist. 10	87,000	125	87,125	87,125
Utah	6,200	.....	6,200	6,000
Wyoming	283,600	.....	283,600	281,400
Others	‡300	.....	‡300	‡300
Total U. S.	6,720,050	114,700	**6,834,750**	6,817,500
Change from previous week, up			**17,250**	
Canada	†277,500	.....	†277,500	†309,075

Total U. S. production January 1-April 16 ..... 716,007,725 bbl.
Same period last year (crude plus cond.) ..... *679,140,620 bbl.

*Includes 11,030,175 bbl. condensate. †Week ended previous Monday. ‡S. D. 100, Nev. 200.

CRUDE-OIL STOCKS



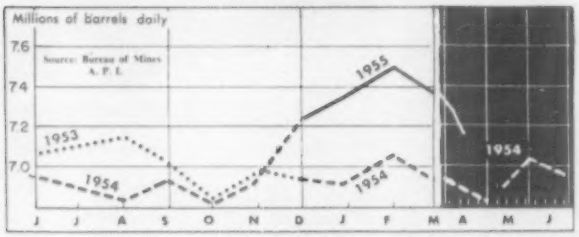
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

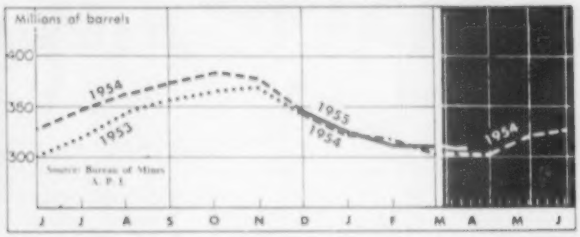
	Apr. 9, '55	Apr. 2, '55	Apr. 10, '54
Pennsylvania Grade	2,823	2,788	2,945
Other Appalachian	2,236	2,059	1,664
Illinois, Indaina, Michigan	10,707	10,888	12,110
Nebraska, North Dakota	2,105	1,661	(‡)
Kansas	8,395	8,064	9,922
Oklahoma	25,106	24,544	26,508
Arkansas	3,194	2,990	3,218
Louisiana	15,062	14,878	14,545
North	2,425	2,421	2,532
South	12,637	12,457	12,013
Mississippi	3,161	2,884	3,533
New Mexico	8,308	8,309	7,787
Texas	123,647	122,564	123,592
East Texas proper	10,002	10,214	10,351
West Texas	54,349	53,993	53,516
Texas Gulf	24,485	23,682	26,343
Other Texas	34,811	34,675	33,382
Wyoming	15,233	14,278	13,728
Other Rocky Mountain	5,364	5,855	3,716
California	32,796	33,194	34,814
Foreign	†10,914	11,607	11,154
Total	269,051	266,563	269,236

*Bureau of Mines. †Includes 2,511,000 bbl. in California. ‡Included with Kansas.

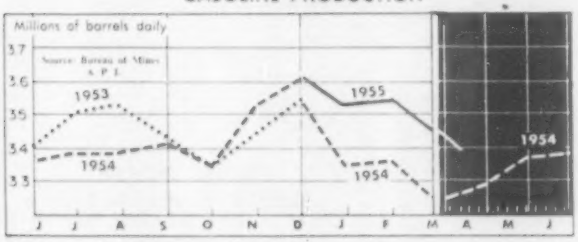
REFINERY RUNS



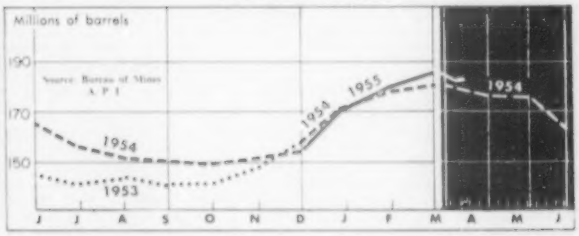
FOUR-PRODUCT STOCKS



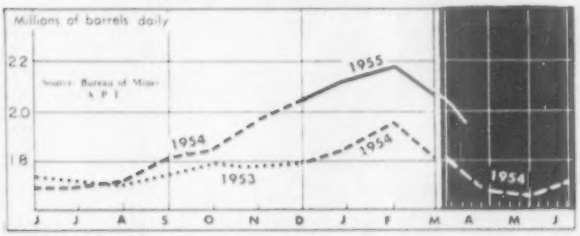
GASOLINE PRODUCTION



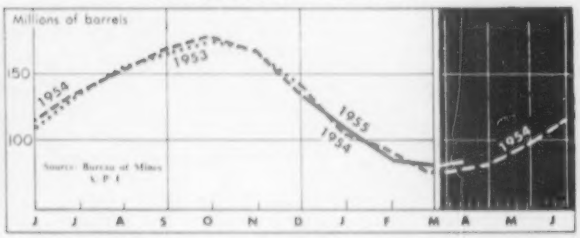
GASOLINE STOCKS



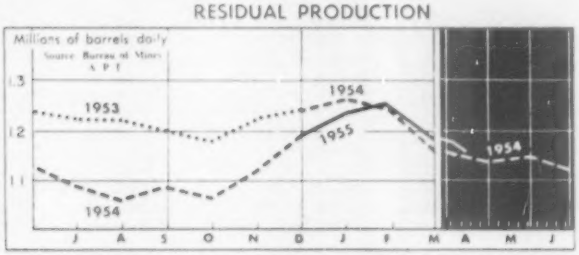
MIDDLE-DISTILLATE PRODUCTION



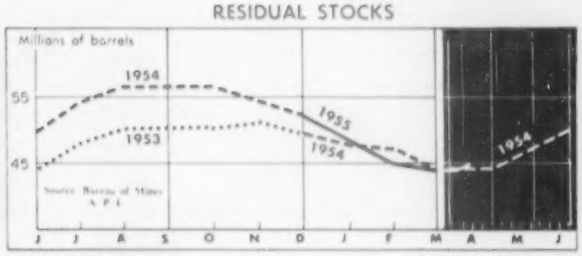
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, APRIL 15

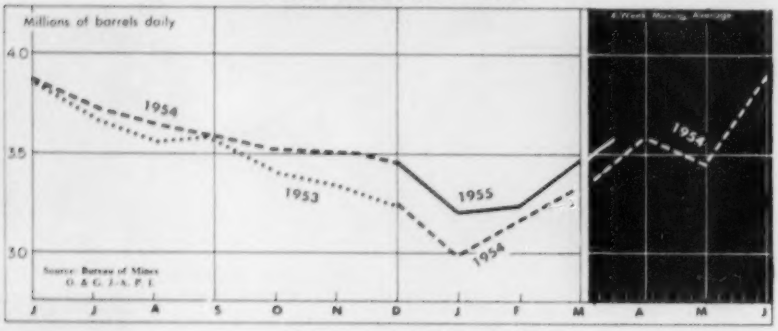
(Excludes all jet-fuel components)

(Thousands of barrels)

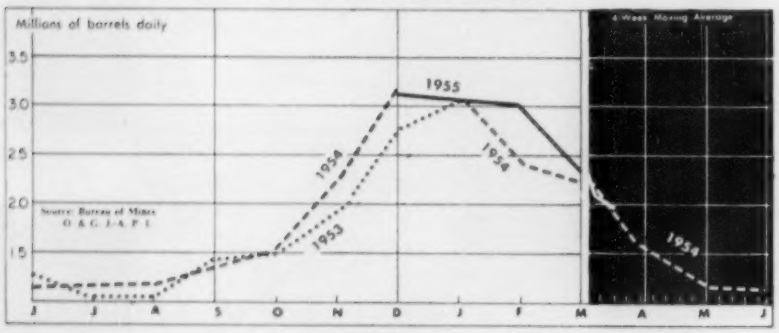
District—	Daily avg. runs	Daily average production: Gaso.*	Kero.	Dist.	Resid.	Stocks‡: Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, April 1954: Daily avg. runs	Daily average production: Gaso.*	Kero.	Dist.	Resid.
East Coast	1,016	415.6	26.9	259.7	213.9	37,872	8,363	21,835	8,137	996	415.8	35.5	228.7	197.6
Appalachian:														
District 1	102	41.3	3.1	26.3	8.1	4,848	490	1,390	306	99	35.5	4.8	20.1	9.6
District 2	93	51.7	7.6	15.3	17.3	2,684	366	612	114	81	43.5	3.5	16.4	11.6
Ind., Ill., Ky.	1,222	669.1	65.9	240.0	171.0	39,166	4,160	9,972	3,316	1,243	654.3	75.4	218.1	163.2
Okla., Kans., Mo.	524	302.0	13.1	129.3	38.0	18,692	922	6,463	944	569	331.3	15.1	125.6	42.3
Inland Texas	269	184.1	14.1	40.4	20.6	6,803	393	1,190	1,345	249	181.6	10.6	49.8	25.4
Texas Gulf Coast	1,844	850.3	127.9	414.8	213.7	25,613	2,061	6,692	4,035	1,690	813.3	107.8	365.4	239.5
La. Gulf Coast	654	329.6	36.6	172.3	36.7	11,447	1,447	3,606	1,377	548	260.5	52.9	133.4	45.7
N. La. and Ark.	81	28.9	9.3	18.6	6.4	4,511	741	1,161	109	83	30.7	7.5	19.9	5.9
Rocky Mountain:														
New Mexico	20	11.1	1.0	2.9	2.9	149		80	34	17	11.0	0.7	2.9	2.3
Other Rocky Mtn.	224	94.4	3.1	61.8	28.0	8,335	201	1,977	697	211	108.1	2.8	51.8	36.0
California	1,082	452.9	2.4	167.3	390.0	21,744	307	8,382	24,327	1,025	412.2	5.6	141.8	361.4
April 15, 1955	7,131	3,431.0	311.0	1,548.7	1,146.6	181,864	19,451	63,360	44,741	6,811	3,297.8	322.2	1,373.9	1,140.5
April 8, 1955	6,992	3,347.7	328.6	1,586.4	1,184.7	183,185	18,696	61,934	44,620					
April 16, 1954	6,915	3,371.1	302.7	1,411.6	1,207.7	178,923	17,527	57,034	43,265					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

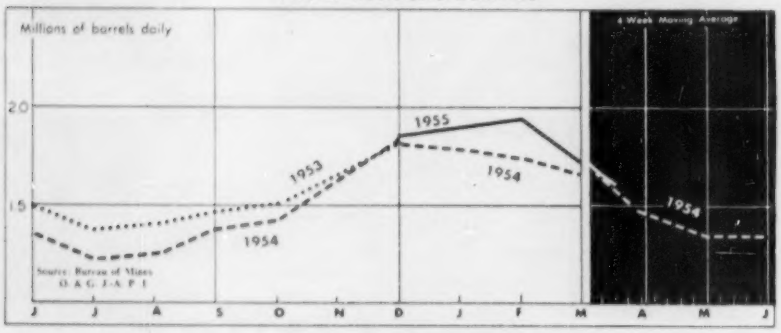
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of April 20, 1955. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.25-11	11.25-12	10.25-10.75
Premium gasoline	11.25-12	13-13.75	11.50-11.75
42-44 w.w. kerosine	9.5-9.75	10.6-10.7	9.25-9.5
No. 2 straw fuel oil	8.75-9.0	9.8-9.95	8.75-9.0
No. 6 residual	$1.55-1.65	$2.35-2.45	$1.95-2.00

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	4.5	4.0	4.25
Grade 18-55	5.4	4.9	5.15

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	18
200 vis., No. 3 neutral, 0-10 pp.	13.25

WAX

Mid-Continent

132-134 A.M.P.	6.0

• Seasonal contracts for road oil from Mid-Continent refineries have cut into the supply of residual fuel. The Group 3 low for No. 6 fuel is up to $1.55 a barrel with little material available at this price. Light fuel on the Gulf Coast reflects soft markets on the East Coast.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four wks. ended 4-15-55	3,431	3,579
January 1955	3,639	3,192
March 1954	3,261	3,331
April 1954	3,298	3,547
Middle distillate:		
Four wks. ended 4-15-55	1,860	1,961
January 1955	2,148	3,000
March 1954	1,811	2,235
April 1954	1,696	1,592
Residual fuel:		
Four wks. ended 4-15-55	1,147	1,606
Janaury 1955	1,235	1,908
March 1954	1,169	1,664
April 1954	1,141	1,479

CRUDE PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.*	Okla-homa, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87			
15-15.9	1.93			
16-16.9	1.99			
17-17.9	2.05			
18-18.9	2.11			
19-19.9	2.18			
20-20.9	2.24	$2.50		$2.37
21-21.9	2.30	2.52		2.39
22-22.9	2.37	2.54		2.41
23-23.9	2.45	2.56		2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9		2.76	3.09	2.63
34-34.9		2.78	3.11	2.65
35-35.9		2.80	3.13	2.67
36-36.9		2.82	3.15	2.69
37-37.9		2.84	3.17	2.71
38-38.9		2.86	3.19	2.73
39-39.9		2.88	3.21	2.75
40 and above		2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Sour. Includes New Mexico Permian.

Effective dates: California, February 16, 1953; east of California, June 15, 1953; Pennsylvania Grade, January 21, 1955.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	3.50
Middle District	3.37
Southwest Pennsylvania	3.08
West Virginia	2.97
Buckeye Grade	2.91
Zanesville Grade	2.72
Illinois Basin	2.90

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Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

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#527—Franks Model 44-TM, Single Drum, Truck Mounted Servicing Unit, 8x10x50' Single Pole Mast, Mounted on FWD Truck.
#536—Franks Model E.T. Single Drum Servicing Unit, 8x10x62' Single Pole Mast, Mounted on 1941 R8-F International Truck.
#542—Franks Model 65-TM, Single Drum Servicing Unit, 8x10x62' Single Pole Mast, Mounted on 1947 KB-11 International Truck.
#543—Franks Model 65-TM, Single Drum Servicing Unit, 8x10x62' Single Pole Mast, Mounted on 1947 KB-11 International Truck.

#517—Type 3 O.C.S. Servicing Unit mounted on 1942 Mack Truck. Located Odessa, Texas.
#525—50/60 Ideco Skid Servicing Unit. Double Pole Mast. Mounted on International Tandem Truck.
#533—Cardwell KL Double Drum Spudder with 60 ft. derrick.

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TULSA, OKLAHOMA

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FOR SALE: Three type 80 Cooper Gas Engine Compressors completely rebuilt. Two type 80 Cooper Compressors as is. One 100 H.P. Superior as is or rebuilt. One Clark 100 H.P. Gas Engine driven Compressor. W. S. Smith, 205 Thompson Bldg., Tulsa, Okla.

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$50,000 New Spare Parts for above.
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2—LeCourtney Centrifugal Pumps, 400 gpm, 460' head, 15 HP motor, 15 HP turbine.
2—Worthington Centrifugal Pumps 60 gpm, 460 head, 15 HP motor, 15 HP turbine.

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COMPLETE PORTABLE Workover Rig—Cardwell KL Drawworks Gardner-Denver High Pressure Mud Pump Winch Truck and Tandem Float House Trailer and all Tools. Also Casing Pulling Equipment. Price $16,500.00. Spartan Well Service, 1201 Wilson Building, Corpus Christi, Texas.

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3200 ft. 4½" Full Hole Drill Pipe, Hughes Joints unitized 6-4-6 Water Pump with Ud International Engine Rig complete with Light Plant, Shale Shaker, Steel Pipe Racks, two Tool Houses, Tongs, small tools, Drilling Line, Hose, etc. Located East Texas.
1—National 50A Rig Complete with two 325 HP Superior Gas Engines, Lee C. Moore Derrick.
8,000 ft. 4½" Drill Pipe—Rig 2 years old. Located West Texas.
1—National 50 Rig Complete with 3 NKU Waukesha engines, stand by pump, steel slush pits, 8,000 ft. 4½" Drill Pipe, Lee C. Moore Jack Knife Derrick. Heavy Blow-out preventors—Rig 5 years old. Located West Texas.

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WANTED: Small rotary drill to drill approximately 300 to 500 feet. Box 400, Great Bend, Kansas.

WANTED

Eight inch pipe threading and cutting machine, Landis Heads preferred, for plumbing and heating contractor's shop.

BOX H-761,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

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OIL INDUSTRY Employment Service. Tom Robinson, owner, 405 Tuloma Bldg., Tulsa, Oklahoma. For technical and trained oil industry personnel.

WANTED: Junior Petroleum Engineer for gas lift sales and Engineering work. Macco Oil Tool Co., Inc. P. O. Box 7288, Houston 8, Texas.

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with broad general knowledge of the petroleum industry in East Texas, North Louisiana and South Arkansas to fill position with well established firm in area. State qualifications in detail.

Box H-705, The Oil and Gas Journal, Tulsa, Oklahoma.

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Box H-741, The Oil and Gas Journal, Tulsa, Oklahoma.

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Small new oil company, financially strong, wants graduate petroleum engineer with operating experience in Gulf Coast, to establish and manage producing department.

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Write, giving experience, education, and age. Enclose a photograph, if possible. Include present address and telephone number.

All applications will be treated as confidential.

BOX H-760,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

OFFICE MAN WANTED BY SUPPLY COMPANY. Must be capable of writing specifications for complete drilling rigs. Graduate Petroleum Engineer preferred. Established, well-known company in the Midwest. Send background and complete information to Box H-716, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER. Must have varied experience in drilling, completion, and workovers for independent oil company in Illinois Basin. Give qualifications, references and salary expected in first reply. Box H-727, The Oil and Gas Journal, Tulsa, Oklahoma.

MAN TO RUSTLE drilling and production deals. Geological, land, or engineering background. Give reference first letter held in confidence. Remuneration commensurate with ability plus agreed participation percentage. Expect reasonable trial period pointing toward permanent association. Box H-740, The Oil and Gas Journal, Tulsa, Oklahoma.

SAFETY DIRECTOR to supervise the safety activities of natural gas transmission company. Location: Detroit. Must be willing to travel. Salary open. Include resume of experience and education. All applications treated confidential. Box H-734, The Oil and Gas Journal, Tulsa, Oklahoma.

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BOX H-450,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

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FIELD SALESMAN, Oil Field Supply Company has opening in Ohio. Prefer experienced person. In making application give personal qualifications, former experience and salary expected. All applications treated with utmost confidence. Write Box H-732, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM GEOLOGIST

Wanted for Staff position in growing independent oil company in West Texas. Must be man of mature age and judgment with at least ten years of practical and successful oil finding experience in exploration and development geology. Should have administrative ability to organize and supervise the work of two or more district geological offices. Salary will be commensurate with experience and abilities. Preferable age limits 35 to 45. In replying please give complete personal and professional background and references. Small recent photo would be helpful. All applications will be treated in utmost confidence, but personal interview will be arranged only if data furnished is adequate and meets our requirements. Box H-691, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

GEOLOGIST, Research, M.S., married, age 36, eight years responsible experience. Details furnished upon request. Box H-764, The Oil and Gas Journal, Tulsa, Oklahoma.

RESPONSIBLE position desired Exploration, Land, or related fields. Geophysicist, 30, Engineering Degree, 5½ years interpretation, 3½ Party Chief, Major Oil Co. Box H-766, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED TEXAS ATTORNEY, under 40, specializing in oil and land title practice, general counsel for independent drillers and operators, recognized trial attorney, desires responsible legal or executive job with substantial company. Some experience in negotiations, leasing work and operations of leases, qualified to head legal and land departments. Honor graduate, LLB. Please state salary range, location, future of job. Will relocate anywhere. Box H-758, The Oil and Gas Journal, Tulsa, Oklahoma.

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Petroleum companies with domestic and/or foreign operations interested in reviewing records of these employees are invited to write to:

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Radio City Station
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CANADA-PLANT ENGINEER or mechanical supervisor. Five years experience Petro-Chemical and refinery engineering, maintenance, construction. Graduate mechanical engineer. Refinery Chemical plant or allied industry. Box H-751, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: 36, experienced in all phases of oil and gas industry, including exploration, exploitation, leasing, deals and farmouts. Present managerial position with major company. Desires work with independent company or financially able individuals interested in oil, gas, uranium exploration in Rocky Mountains. Box H-752, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 32, graduate, 5 years engineering experience in drilling and production with major company in West Texas. Desire change to independent in Oklahoma or East Texas. Box H-726, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, D.Sc., 33, surface and subsurface exploration, desires attractive foreign assignment. Box H-765, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT—Oil and heavy manufacturing experience in supervisory capacity. Restricted to South or West Texas due to health of wife. Age 41. Box H-737, The Oil and Gas Journal, Tulsa, Oklahoma.

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WANTED

SETTLED OIL production wanted by independent operator direct from producer. P. O. Box 852, Oklahoma City, Oklahoma.

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JACK EAGLE, Oil Properties, 706 City Nat'l. Bldg., Oklahoma City, Oklahoma, Telephone REgent 6-7027.

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CONTACT A. L. Bowles, Box 947, Ada, Okla., for Drilling Deals, Oil Investments.

320 ACRE LEASE—Small Hunton well, additional proven acreage Sabetha, Kansas for sale cheap. R. D. Swan, 818 Kennedy Bldg., Tulsa.

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FOR SALE: 450 acre oil lease with thirteen producing wells, 25 to 50 feet of Bartlesville sand, all wells under two years old, all new equipment, two large tank batteries with separators. Located on pipe line and good road, nine wells on electric power with time clocks, four wells natural gas engines. No dry holes drilled on this acreage, locations for twenty more wells. Starting new well expect to core around April thirtieth. Anyone interested may check this well and get first hand information. C. H. Blosser, Concordia, Kansas.

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ASPHALT—Consulting service on manufacture, paving, roofing asphalts and specialties; formulation, applications. Rheology and highway engineering. Box H-759, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—Someone to Manufacture, and Sell, a New Pipe Line Valve, recently designed and developed to meet the increasing requirements, for simplicity, efficiency, and positive sealing. Write P. O. Box 404, San Marcos, Texas.

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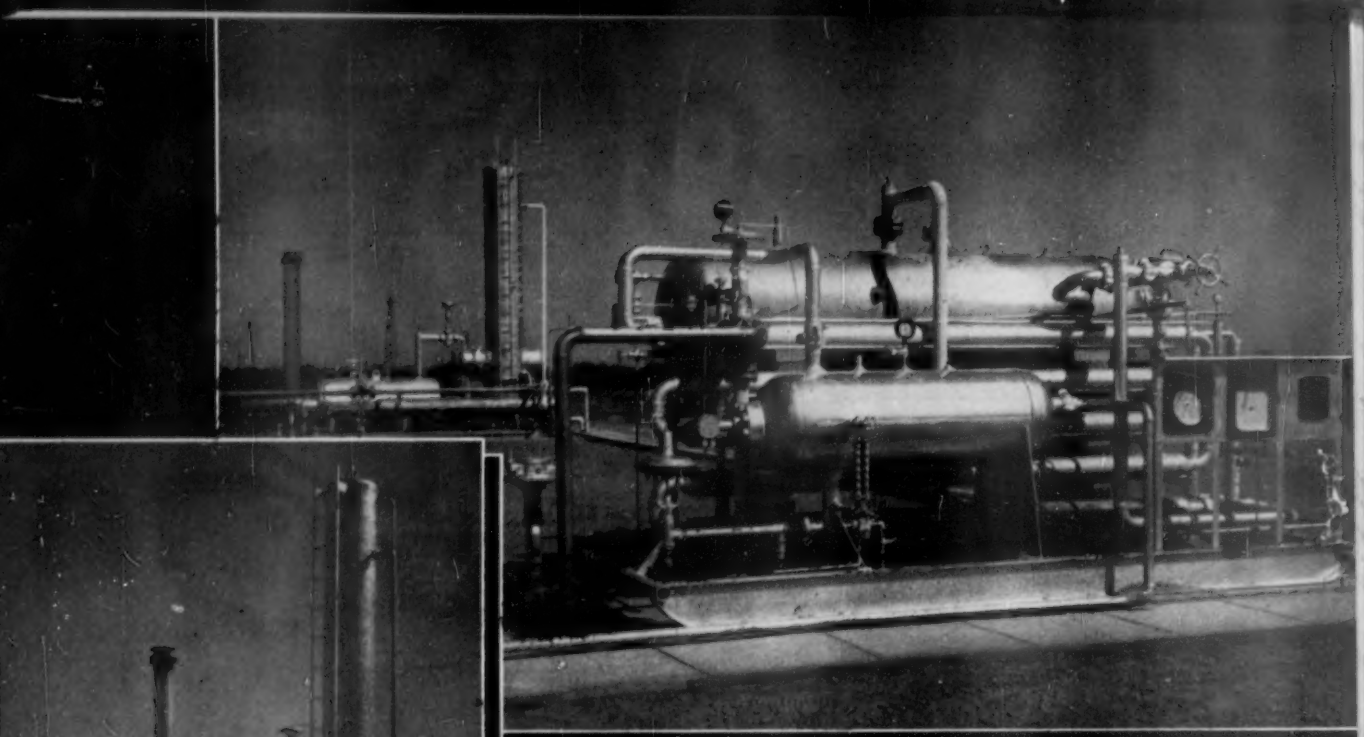
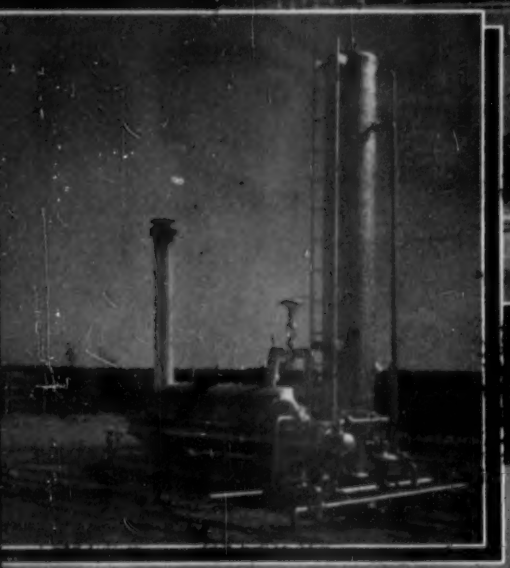
LEGAL

SEALED BIDS FOR OIL AND GAS leases on the Crow Indian Reservation, Montana, will be received in the Office of the Superintendent, Crow Agency, Montana, until 2:00 o'clock (M.S.T.), WEDNESDAY, APRIL 27th, 1955 at which time they will be opened and publicly read. Four (4) Units involving 5,063.76 acres of trust Indian lands, which mineral rights are reserved for the benefit of the Crow Tribe by Act of Congress, will be offered. For further detailed information and a list of lands advertised call or write: L. C. Lippert, Supt., Crow Indian Agency, Crow Agency, Montana.

LEGAL

Sealed bids will be received until 2:00 P.M. Mountain Standard Time April 28, 1955, and opened at that time in the office of the Navajo Indian Agency, Window Rock, Arizona, for the leasing of approximately 62,550 acres of tribal land which are divided into 30 tracts and are located in McKinley and San Juan Counties in New Mexico, and San Juan County, Utah, for oil and gas mining purposes. The details of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the General Superintendent of the Navajo Indian Agency, attention: Branch of Realty, Window Rock, Arizona.





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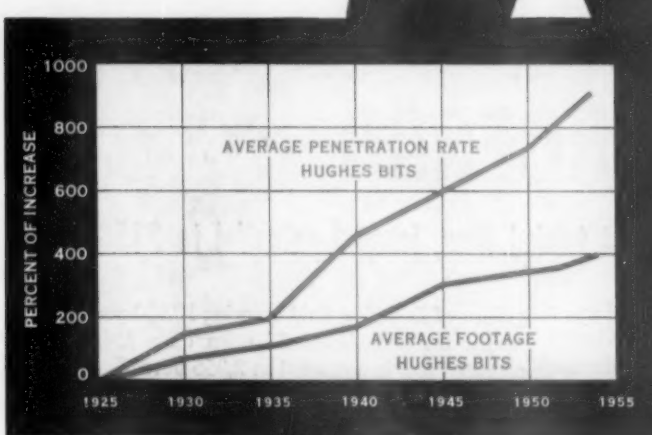
Significantly, the gains in penetration rate, charted below, parallel the introduction of new Hughes bit designs: Acme self-cleaning cones in 1925; unit type bits in 1931; Tri-Cone bits in 1933; offset Tri-Cones in 1935; improved hard formation bits, such as the W-7R, in the early 40's; long-toothed OSC-3's in 1947; jet bits in the late 40's, and Hugheset bits in the early 1950's. For assured performance operators the world over are running HUGHES bits.